SLV-798HF/998HF

RMT-V229/V232C

SERVICE MANUAL

US Model
SLV-798HF/998HF

Canadian Model
SLV-798HF/998HF

Chilean Model
Mexican Model
PX Model
SLV-998HF

Photo : SLV-998HF

Hi-Fi

VHS

- **Refer to the SERVICE MANUAL of VHS MECHANICAL ADJUSTMENT Ⅵ for MECHANICAL ADJUSTMENTS. (9-921-647-11)**

S MECHANISM

SPECIFICATIONS

System

Format
VHS NTSC standard
Video recording system
Rotary head helical scanning FM system
Video heads
Double azimuth four heads
Video signal
NTSC color, EIA standards
Tape speed
SP: 33.35 mm/s (1 3/8 inches/s)
EP: 11.11 mm/s (7/16 inches/s)
LP: 16.67 mm/s (11/16 inches/s), playback only
Maximum recording/playback time
8 hrs. in EP mode (with T-160 tape)
Fast-forward and rewind time
Approx. 3 min. (with T-120 tape)

Tuner section

Channel coverage
VHF 2 to 13
UHF 14 to 69
CATV A-8 to A-1, A to W, W+1 to W+84
Antenna
75-ohm antenna terminal for VHF/UHF

Inputs and outputs

LINE-1 IN and -2 IN
VIDEO IN, phono jack (1 each)
Input signal: 1 Vp-p, 75 ohms, unbalanced, sync negative
AUDIO IN, phono jack (2 each)
Input level: 327 mVrms
Input impedance: more than 47 kilohms
LINE OUT
VIDEO OUT, phono jack (1)
Output signal: 1 Vp-p, 75 ohms, unbalanced, sync negative
AUDIO OUT, phono jack (2)
Standard output: 327 mVrms
Load impedance: 47 kilohms
Output impedance: less than 10 kilohms
S-LINK (CONTROL S IN)
Mini jack (1)
CABLE BOX CONTROL (CONTROL S OUT)
Stereo mini jack (plug in power) (1)

Timer section

Clock
Quartz locked
Timer indication
12-hour cycle
Timer setting
8 programs per month (max.)
Power back-up
Built-in self-charging capacitor
Back-up duration: up to 1 hour at a time

General

Power requirements
120 V AC, 60 Hz (US, Canadian, Mexican, models)
110 V AC to 240 V AC, 50/60 Hz (Chilean, PX models)
Power consumption
24 W (Except Chilean, Mexican, PX models)
20 W (Chilean, Mexican, PX models)
Operating temperature
5 °C to 40 °C (41 °F to 104 °F)
Storage temperature
– 20 °C to 60 °C (– 4 °F to 140 °F)
Dimensions
Approx. 430 × 107 × 287 mm (w/h/d)
Approx. (17 × 4 1/4 × 11 3/8 inches) including projecting parts and controls
Mass
Approx. 4.3 kg (9 lb 8 oz)

Supplied accessories

Remote commander (1)
Size AA (R6) batteries (2)
75-ohm coaxial cable with F-type connectors (1)
Audio/video cable (3 phono, 1 mini to 3 phono, 1 mini) (1)
Cable Mouse (cable box controller) (1)
Jack cover (1)
Plug adaptor (1) (Chilean, PX model only)

Design and specifications are subject to change without notice.

VIDEO CASSETTE RECORDER

MICROFILM

SONY®

DIFFERENT SPECIFICATIONS

MODEL / SPECIFICATIONS	SLV-798HF	SLV-998HF
FLYING ERASE HEAD	—	BUILT-IN
BODY COLOR	BLACK	BLACK
REMOTE COMMANDER	RMT-V232C	RMT-V229

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK ⚠ OR DOTTED LINE WITH MARK ⚠ ON THE SCHEMATIC DIAGRAMS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

ATTENTION AU COMPOSANT AYANT RAPPORT À LA SÉCURITÉ!

LES COMPOSANTS IDENTIFÉS PAR UNE MARQUE ⚠ SUR LES DIAGRAMMES SCHÉMATIQUES ET LA LISTE DES PIÈCES SONT CRITIQUES POUR LA SÉCURITÉ DE FONCTIONNEMENT. NE REMPLACER CES COMPOSANTS QUE PAR DES PIÈSES SONY DONT LES NUMÉROS SONT DONNÉS DANS CE MANUEL OU DANS LES SUPPÉMENTS PUBLIÉS PAR SONY.

SAFETY CHECK-OUT

After correcting the original service problem, perform the following safety checks before releasing the set to the customer.

1. Check the area of your repair for unsoldered or poorly-soldered connections. Check the entire board surface for solder splashes and bridges.
2. Check the interboard wiring to ensure that no wires are "pinched" or contact high-wattage resistors.
3. Look for unauthorized replacement parts, particularly transistors, that were installed during a previous repair. Point them out to the customer and recommend their replacement.
4. Look for parts which, though functioning, show obvious signs of deterioration. Point them out to the customer and recommend their replacement.
5. Check the line cord for cracks and abrasion. Recommend the replacement of any such line cord to the customer.
6. Check the B+ voltage to see it is at the values specified.
7. Check the antenna terminals, metal trim, "metallized" knobs, screws, and all other exposed metal parts for AC leakage. Check leakage as described below.

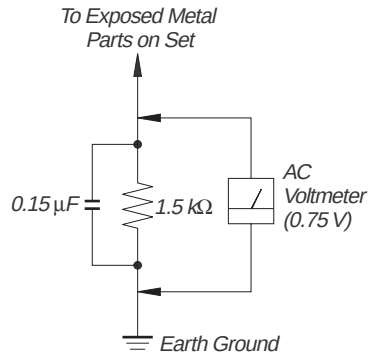


Fig. A. Using an AC voltmeter to check AC leakage.

LEAKAGE TEST

The AC leakage from any exposed metal part to earth ground and from all exposed metal parts to any exposed metal part having a return to chassis, must not exceed 0.5mA (500 microampers). Leakage current can be measured by any one of three methods.

1. A commercial leakage tester, such as the Simpson 229 or RCA TW-540A. Follow the manufacturers' instructions to use these instruments.
2. A battery-operated AC milliammeter. The Data Precision 245 digital multimeter is suitable for this job.
3. Measuring the voltage drop across a resistor by means of a VOM or battery-operated AC voltmeter. The "limit" indication is 0.75V, so analog meters must have an accurate low voltage scale. The Simpson 250 and Sanwa SH-63Trd are examples of a passive VOM that is suitable. Nearly all battery operated digital multimeters that have a 2V AC range are suitable. (See Fig. A)

TABLE OF CONTENTS

SERVICE NOTE

1. ERROR CODE INDICATION ····· 6
2. HOW TO REPLACE A ROTARY UPPER DRUM ····· 7
2-1. HOW TO REMOVE A ROTARY UPPER DRUM ····· 7
2-2. HOW TO ATTACH A NEW ROTARY UPPER DRUM ···· 7

1. GENERAL

Getting Started
- Unpacking ····· 1-1
- Setting up the remote commander ····· 1-1
- Hookups ····· 1-1
- Selecting a language ····· 1-7
- Setting the clock ····· 1-7
- Setting up cable box control ····· 1-9
- Presetting channels ····· 1-10
- Setting up VCR Plus+ ····· 1-11

Basic Operations
- Playing a tape ····· 1-12
- Recording TV programs ····· 1-13
- Recording TV programs using VCR Plus+ ····· 1-14
- Setting the timer manually ····· 1-14

Additional Operations
- Playing/searching at various speeds ····· 1-15
- Searching for a selected point on the tape ····· 1-16
- Skip-searching automatically ····· 1-16
- Recording TV programs using the quick timer ····· 1-16
- Checking/changing/cancelling timer settings ····· 1-17
- Recording stereo and bilingual programs ····· 1-17
- Adjusting the picture ····· 1-18
- Changing menu options ····· 1-18
- Editing with another VCR ····· 1-18

Additional Information
- General setup information ····· 1-19
- Index to parts and controls ····· 1-20

2. DISASSEMBLY

2-1. UPPER CASE, FRONT PANEL BLOCK ASSEMBLY ····· 2-1
2-2. FR-130 BOARD, DM-74 BOARD ····· 2-1
2-3. REAR PANEL ····· 2-1
2-4. POWER BLOCK, MA-318 BOARD (WITH S MECHANISM DECK) ····· 2-2
2-5. S MECHANISM DECK ····· 2-2
2-6. INTERNAL VIEWS ····· 2-3
2-7. INTERNAL VIEWS ····· 2-4

3. BLOCK DIAGRAMS

3-1. OVERALL BLOCK DIAGRAM ····· 3-1
3-2. VIDEO BLOCK DIAGRAM ····· 3-3
3-3. SERVO/SYSTEM CONTROL BLOCK DIAGRAM ····· 3-5
3-4. AUDIO BLOCK DIAGRAM ····· 3-7
3-5. MODE CONTROL BLOCK DIAGRAM ····· 3-9
3-6. TUNER BLOCK DIAGRAM ····· 3-11
3-7. POWER SUPPLY BLOCK DIAGRAM ····· 3-13

4. PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS

4-1. FRAME SCHEMATIC DIAGRAM ····· 4-1
4-2. PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS ····· 4-2
- MA-318 (REC/PB AMP, VIDEO, SERVO/SYSTEM CONTROL, AUDIO, TUNER) PRINTED WIRING BOARD ····· 4-2
- MA-318 (REC/PB AMP) SCHEMATIC DIAGRAM ·· 4-5
- MA-318 (VIDEO, NORMAL AUDIO) SCHEMATIC DIAGRAM ····· 4-8
- MA-318 (SERVO/SYSTEM CONTROL) SCHEMATIC DIAGRAM ····· 4-11
- MA-318 (ON SCREEN DISPLAY) SCHEMATIC DIAGRAM ····· 4-15
- MA-318 (DSF) SCHEMATIC DIAGRAM ····· 4-17
- MA-318 (V-SET) SCHEMATIC DIAGRAM ····· 4-19
- MA-318 (AFM AUDIO) SCHEMATIC DIAGRAM ····· 4-21
- MA-318 (TUNER) SCHEMATIC DIAGRAM ····· 4-23
- MA-318 (POWER SUPPLY, AV-BUS) SCHEMATIC DIAGRAM ····· 4-25
- FR-130 (MODE CONTROL) PRINTED WIRING BOARD ····· 4-27
- FR-130 (MODE CONTROL) SCHEMATIC DIAGRAM ····· 4-29
- DM-74 (OPERATION SWITCHES) PRINTED WIRING BOARD AND SCHEMATIC DIAGRAM ····· 4-31
- JK-159 (LINE-2 IN) PRINTED WIRING BOARD AND SCHEMATIC DIAGRAM ····· 4-33
- POWER BLOCK SR801 (SWITCHING REGULATOR) PRINTED WIRING BOARD AND SCHEMATIC DIAGRAM ····· 4-35
- POWER BLOCK SR709 (SWITCHING REGULATOR) PRINTED WIRING BOARD AND SCHEMATIC DIAGRAM ····· 4-37

5. INTERFACE, IC PIN FUNCTION DESCRIPTION

SYSTEM CONTROL — VIDEO BLOCK INTERFACE (MA-318 BOARD IC161) ····· 5-1
SYSTEM CONTROL — SERVO PERIPHERAL CIRCUIT INTERFACE (MA-318 BOARD IC161) ····· 5-1
5-3. SYSTEM CONTROL — MECHANISM INTERFACE (MA-318 BOARD IC161) ····· 5-2
5-4. SYSTEM CONTROL — SYSTEM CONTROL PERIPHERAL CIRCUIT INTERFACE (MA-318 BOARD IC161) ····· 5-2
SYSTEM CONTROL — AUDIO BLOCK INTERFACE (MA-318 BOARD IC161) ····· 5-2
5-6. SERVO/SYSTEM CONTROL MICROPROCESSOR PIN FUNCTIONS (MA-318 BOARD IC161) ····· 5-3
5-7. TUNER/TIMER MODE CONTROL PIN FUNCTIONS (FR-130 BOARD IC460) ····· 5-4

6. ADJUSTMENTS

MECHANICAL ADJUSTMENTS ····· 6-1
6-2. ELECTRICAL ADJUSTMENTS ····· 6-1
2-1. PREPARATION BEFORE ADJUSTMENT ····· 6-1
2-1-1. Equipment Required ····· 6-1
2-1-2. Equipment Connection ····· 6-1
2-1-3. Input Signal Check ····· 6-1
2-1-4. Alignment Tape ····· 6-1
2-1-5. Input/Output Levels and Impedance ····· 6-2
2-1-6. Adjustment Sequence ····· 6-2
2-2. POWER SUPPLY CHECK ····· 6-2
2-2-1. Output Voltage Check (MA-318 Board) ····· 6-2
2-3. SERVO SYSTEM CHECK ····· 6-3
2-3-1. RF Switching Position/ AF Switching Position Adjustments (MA-318 Board) ··· 6-3
2-4. VIDEO SYSTEM CHECKS AND ADJUSTMENT ····· 6-4
2-4-1. X'tal OSC Check (MA-318 Board) ····· 6-4

2-4-2. SYNC AGC Check (MA-318 Board) ····· 6-4
2-4-3. Recording Y Level Check (MA-318 Board) ····· 6-4
2-4-4. Recording Chroma Level Check (MA-318 Board) ····· 6-5
2-4-5. Playback Level Check (MA-318 Board) ····· 6-5
2-5. AUDIO SYSTEM ADJUSTMENT ····· 6-5
2-5-1. ACE Head Adjustment ····· 6-5
2-5-2. E-E Output Level Check ····· 6-5
2-5-3. Overall Output Level and Distortion Factor Check ····· 6-6
2-5-4. Overall Noise Level Check ····· 6-6
2-6. TUNER SYSTEM ADJUSTMENT ····· 6-6
2-6-1. Separation Adjustment (MA-318 Board) ····· 6-6
2-7. ADJUSTING PARTS LOCATION DIAGRAM ····· 6-8

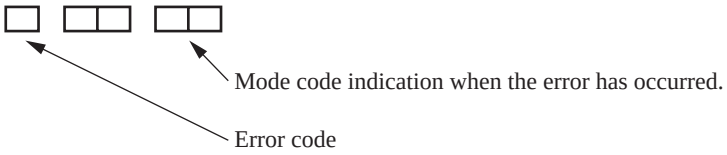
7. REPAIR PARTS LIST

7-1. EXPLODED VIEWS ····· 7-1
7-1-1. FRONT PANEL ASSEMBLY AND UPPER CASE SECTION ····· 7-1
7-1-2. CHASSIS SECTION ····· 7-2
7-1-3. MECHANISM DECK-1 ····· 7-3
7-1-4. MECHANISM DECK-2 ····· 7-4
7-1-5. MECHANISM DECK-3 ····· 7-5
7-2. ELECTRICAL PARTS LIST ····· 7-6

SERVICE NOTE

1. ERROR CODE INDICATION

- Error codes are indicated using the lower 5 digits in the fluorescent display tube.
  "At this time, Colon ":" between character is not indicated."



ERROR CODE

0	No error
1	Cam encoder error Loading direction
2	Cam encoder error Unloading direction
3	T reel error
4	S reel error
5	Capstan error
6	Drum error
7	Error on initializing
8	Cassette loading error
9	Reserve

MODE CODE

0	Power-on eject	10	FWD x1	20	REW play
1	Power-on initial	11	FWD x2	21	Cas. loading
2	Power-off eject	12	CUE	22	Tape loading
3	Power-off stop	13	PB-pause	23	Power-off loading
4	FF	14	RVS-pause	24	Mecha. error (Power on)
5	REW	15	RVS x1	25	Power-on eject initial
6	REC	16	RVS x2	26	Power-off eject initial
7	REC- pause	17	REV	27	APC REC
8	Power-on stop	18	Power-off initial	28	Cas. loading
9	PB	19	Mecha. error (Power off)		(No auto PB check)

2. HOW TO REPLACE A ROTARY UPPER DRUM

See below for note.

2-1. HOW TO REMOVE A ROTARY UPPER DRUM

1) Remove screw ① (+P3 × 8) and remove the ground shaft assembly ②. (Refer to Fig. 4.)
2) Remove soldering which is marked by arrow and remove the rotary upper drum board completely.
3) Remove two screws ③ (PSW3 × 8) and remove the rotary upper drum in the direction of Ⓐ. (Refer to Fig. 5.)
   If removal is difficult, remove it while rotating it slowly.

Note: If removal is difficult, check again if soldering is removed completely.

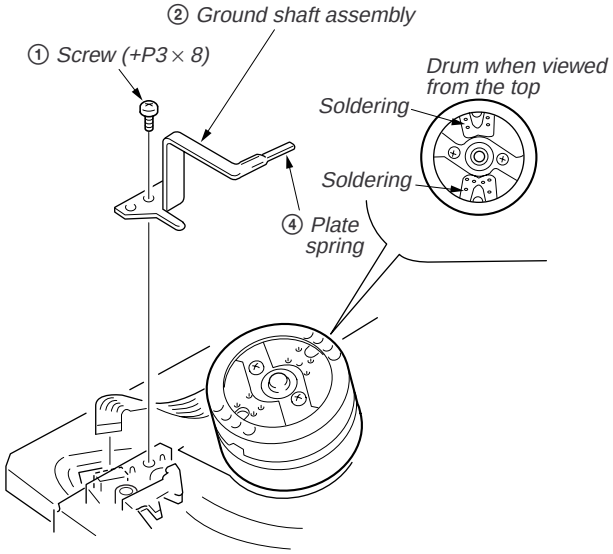


Fig. 4

2-2. HOW TO ATTACH A NEW ROTARY UPPER DRUM

1) Pay attention so that finger print or like must not be put when inserting a new upper drum into lower drum.
2) Align mark of the rotary upper drum board with the mark of the rotary transformer board so that the screw hole on the upper drum and that on the lower drum are aligned. (Refer to Fig. 5.)
3) If attaching is difficult, attach a upper drum while rotating it slowly.

Note: Pay attention not to damage the video heads.
Confirm that the upper drum is inserted completely.

4) Tighten the two screws ③ (PSW3 × 8). (Refer to Fig. 5.)
5) Fix the earth shaft ② by tightening the screw ① (+P3 × 8) so that protrusion at the tip of the earth shaft contacts the center of the drum shaft.

Note: When attaching the ground shaft assembly ②, never give force to the plate spring ④.

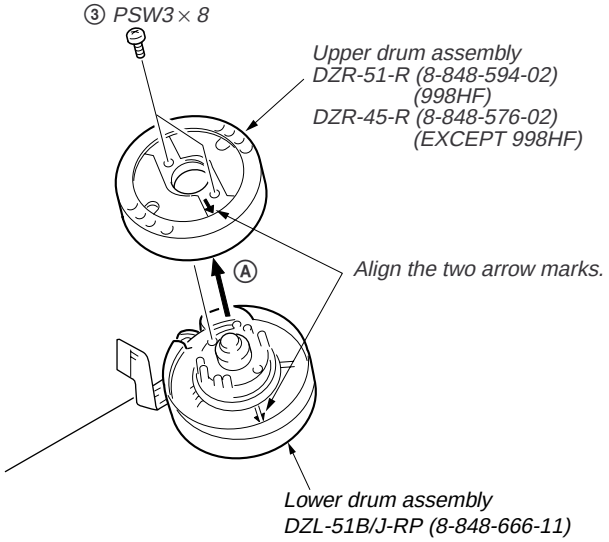


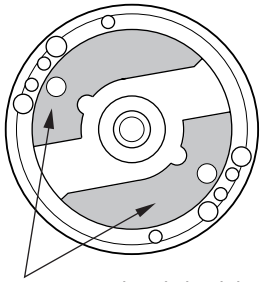
Fig. 5

Note : There are two types of drum assembly built in models.

[Discrimination]

UPPER DRUM ASSEMBLY
DZR-51-R (998HF)
(8-848-594-02)
DZR-45-R (Except 998HF)
(8-848-576-02)

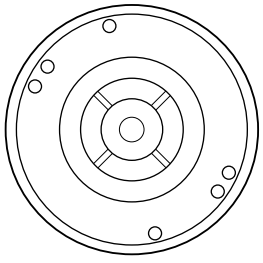
—Top View—



There are two printed circuit boards on the top.

DRUM ASSEMBLY
DZH-96A-R (998HF)
(8-839-046-02)
DZH-94A/Z-RP (Except 998HF)
(8-839-044-02)

—Top View—



There is no printed circuit board.

Note: It cannot be divided to two parts, the upper and the lower drum assemblies.

SECTION 1
GENERAL

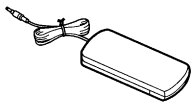
This section is extracted from the SLV-998HF instruction manual.

Step 1
Unpacking

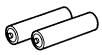
Check that you have received the following items with the VCR:

- Remote commander

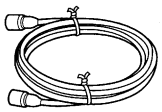
- Cable Mouse (cable box controller)



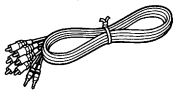
- Size AA (R6) batteries



- 75-ohm coaxial cable with F-type connectors



- Audio/video cable (3-phono, 1 mini to 3-phono, 1 mini)



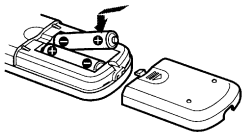
- Jack cover

Step 2
Setting up the remote commander

Inserting the batteries

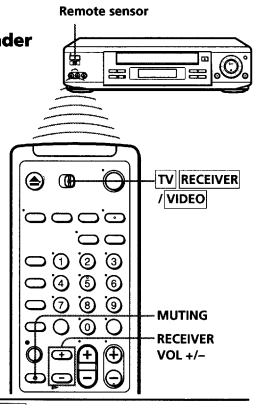
Insert two size AA (R6) batteries by matching the + and – on the batteries to the diagram inside the battery compartment.

Insert the negative (–) end first, then push in and down until the positive (+) end clicks into position.



Using the remote commander

You can use this remote commander to operate this VCR and a Sony TV or AV receiver. Buttons on the remote commander marked with a dot (•) can be used to operate your Sony TV.
The RECEIVER VOL +/– and MUTING buttons can be used to operate your Sony AV receiver.



To operate	Set TV RECEIVER / VIDEO to
the VCR	VIDEO and point at the remote sensor on the VCR
a Sony TV or AV receiver	TV RECEIVER and point at the remote sensor on the TV or AV receiver

Notes

- With normal use, the batteries should last about three to six months.
- If you do not use the remote commander for an extended period of time, remove the batteries to avoid possible damage from battery leakage.
- Do not use a new battery with an old one.
- Do not use different types of batteries.
- Some Sony AV receivers may not be operated with the remote commander.

continued

Step 2: Setting up the remote commander (continued)

Controlling other TVs with the remote commander

The remote commander is preprogrammed to control non-Sony TVs. If your TV is listed in the table below, set the appropriate manufacturer's code number.

1 Set TV RECEIVER / VIDEO at the top of the remote commander to TV RECEIVER.

2 Hold POWER down, and enter your TV's code number(s) using the number buttons. Then release POWER.

Now you can use the POWER, VOL +/–, CH +/–, and TV/VIDEO buttons to control your TV. You can also use the buttons marked with a dot (•) to control a Sony TV. To control the VCR, reset TV RECEIVER / VIDEO to VIDEO.

Code numbers of controllable TVs

If more than one code number is listed, try entering them one at a time until you find the one that works with your TV.

Manufacturer	Code number
Sony	01
Akai	04
AOC	04
Centurion	12
Coronado	03
Curis-Mathes	12
Daytron	12
Emerson	03,04,14
Fisher	11
General Electric	06,10
Gold Star	03,04,17
Hitachi	02,03
J.C.Penny	04,12

Manufacturer	Code number
JVC	09
KMC	03
Magnavox	03,08,12
Marantz	04,13
MGA/Mitsubishi	04,12,13,17
NEC	04,12
Panasonic	06,19
Philco	03,04
Philips	08
Pioneer	16
Portland	03
Quasar	06,18
Radio Shack	05,14

Manufacturer	Code number
RCA	04,10
Sampo	12
Sanyo	11
Scott	12
Sears	07,10,11
Sharp	03,05,18
Sylvania	08,12
Teknika	03,08,14
Toshiba	07
Wards	03,04,12
Yorx	12
Zenith	15

Notes

- If the TV uses a different remote control system from the one programmed to work with the VCR, you cannot control your TV with the remote commander.
- If you enter a new code number, the code number previously entered will be erased.
- When you replace the batteries of the remote commander, the code number automatically resets to 01 (Sony). Reset the appropriate code number.

Step 3
Hookups

Selecting the best hookup option

There are many ways in which your VCR can be hooked up. To hook up your VCR so that it works best for you, first scan through the table below. Then use the accompanying diagrams and procedures on the following pages to set up your VCR.

If you have	Use	Refer to
TV that has audio/video inputs	**Audio/video (A/V) hookup,** then follow one of the hookups below.	**Pages 8 and 9**
Cable box that is compatible with the VCR's cable box control feature	**Hookup 1**	**Pages 10 to 12**
No cable box or incompatible cable box with only a few scrambled channels	**Hookup 2**	**Pages 13 to 15**
Antenna only, no cable TV	**Hookup 3**	**Pages 16 to 18**
Incompatible cable box with many scrambled channels	**Hookup 4**	**Pages 19 to 21**
DSS® receiver	**Hookup 5**	**Pages 22 to 24**
Incompatible cable box with only a few scrambled channels, using an A/B switch	**Hookup 6**	**Pages 25 to 29**

After you've completed the connections, follow the instructions for setup. During setup, if you need more details on the procedure described, page numbers are provided where you can find complete, step-by-step instructions.

After you've completed the setup, you're ready to use your VCR. Procedures differ depending on the hookup you used. For an overview, refer to "Quick reference to using the VCR" on the back cover.

Before you get started

- Turn off the power to all equipment.
- Do not connect the AC power cords until all of the connections are completed.
- Be sure you make connections firmly. Loose connections may cause picture distortion.
- If your TV doesn't match any of the examples provided, see your nearest Sony dealer or qualified technician.

* DSS® is a registered trademark of DIRECTV, Inc., a unit of Hughes Electronics Corporation.

Audio/video (A/V) hookup

Pages 8 and 9

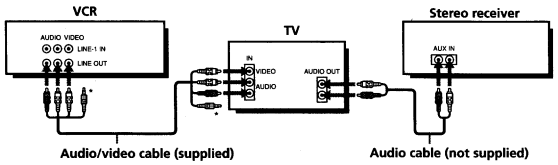
If your TV has audio/video (A/V) input jacks, you will get a better picture and sound if you hook up your VCR using these connections. In addition, for a true "home theater" experience, you should connect the audio outputs of your VCR or TV to your stereo system. If your TV doesn't have A/V inputs, see the following pages for antenna or cable hookups.

If your TV has the S-Link™* (A/V bus control) function, hook up your VCR using the connection shown on page 9. Your TV will automatically switch to the A/V inputs for your VCR when you play back or operate menu on the VCR.

If you're not planning to use your VCR to record programs, you're finished setting up the VCR after you've made the connections shown on pages 8 and 9. If you want to record off-air or off your cable TV system, complete these connections first, and then go to the following pages for antenna or cable hookups.

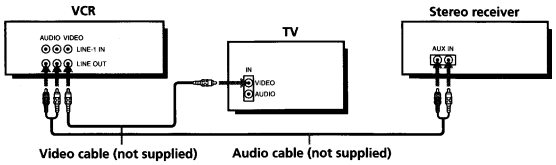
* S-Link™ is a trademark of Sony Corporation.

A Use this hookup if your TV has stereo jacks

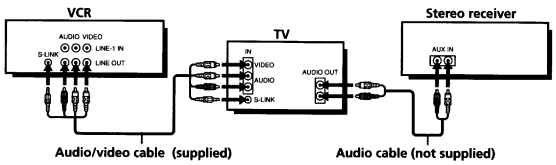


* Do not connect the miniplugs for this hookup.

B Use this hookup if your TV doesn't have stereo jacks



C Use this hookup if your TV has the S-Link™ function



Note

- To play a tape in stereo, you must use the A/V connection.

Caution

Connections between the VCR's VHF/UHF connector and the antenna terminals of the TV receiver should be made only as shown in the following instructions. Failure to do so may result in operation that violates the regulations of the Federal Communications Commission regarding the use and operation of RF devices. Never connect the output of the VCR to an antenna or make simultaneous (parallel) antenna and VCR connections at the antenna terminals of your receiver.

Note to CATV system installer (in USA)

This reminder is provided to call the CATV system installer's attention to Article 820-40 of the NEC that provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building, as close to the point of cable entry as practical.

continued

Hookup 1

Pages 10 to 12

Using cable box control

Recommended use

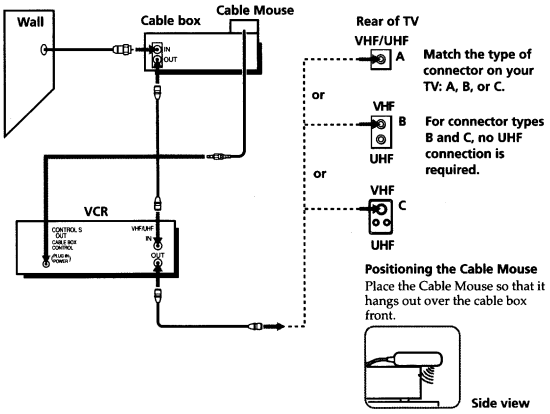
You should use this hookup if you have a cable box, especially if your cable system scrambles all or most channels. This hookup allows the VCR's cable box control feature to control the channel on the cable box, simplifying the recording process. A list of compatible cable boxes is on page 39.

What you can do with this hookup

- Record any channel using the VCR's cable box control feature to select channels on the cable box

What you can't do

- Record with the cable box turned off
- Record one channel while watching another channel



Positioning the Cable Mouse

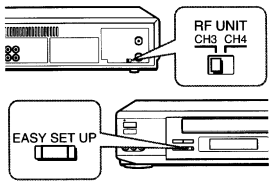
Place the Cable Mouse so that it hangs out over the cable box front.

Side view

Hookup 1: VCR setup

1 Set the RF UNIT switch to CH 3 or CH 4, whichever channel is not used in your area. If both are used, set the switch to either channel.

For details, see page 76.
If you made A/V connections (from page 8), you can skip this step.

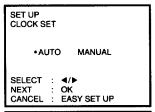


2 Turn on your cable box.

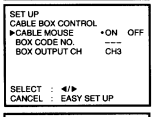
3 Press EASY SET UP on the VCR.

❶ The LANGUAGE menu appears. Change the on-screen display language to Spanish (ESPAÑOL) or French (FRANÇAIS) if desired, and press the joystick (OK). For details, see page 30.

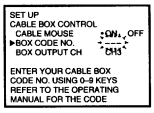
❷ The CLOCK SET menu appears. Select AUTO and press the joystick (OK). For details, see page 31.



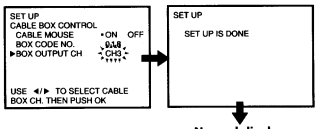
❸ The CABLE BOX CONTROL menu appears. Select ON. For details, see page 38.



❹ Enter your cable box code number and push the joystick to ↓. For details, see page 39.


SET UP
CABLE BOX CONTROL
CABLE MOUSE •ON OFF
►BOX CODE NO. ----
BOX OUTPUT CH CH3
ENTER YOUR CABLE BOX CODE NO. USING 0-9 KEYS
REFER TO THE OPERATING MANUAL FOR THE CODE

❺ Select your cable box output channel and press the joystick (OK).


SET UP
CABLE BOX CONTROL
CABLE MOUSE •ON OFF
BOX CODE NO. 018
►BOX OUTPUT CH CH3
USE ◄/► TO SELECT CABLE BOX CH. THEN PUSH OK
SET UP
SET UP IS DONE

Normal display

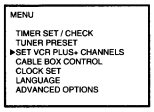
continued

Hookup 1: VCR Plus+ channel setup

1 Find the VCR Plus+ Channel Listing in your program guide. For details, see page 47.

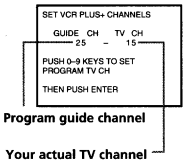
2 If the channels in the program guide are different from the channels that you actually use on your TV, set the channels that are different as follows. For details, see page 48.

❶ Press MENU and select SET VCR PLUS+ CHANNELS.



❷ Enter the program guide channel, then the channel you use on your TV.

❸ Press the joystick (OK).



Automatic clock setting

Once you've set up the VCR, it automatically sets the clock the first time you turn off the VCR. After that, whenever you turn off the VCR, it checks the time and adjusts the clock, even for Daylight Saving Time. The VCR sets the clock by picking up a time signal provided by some TV channels.

If you want to use the timer to record right away, or if the channels in your area do not carry time signals, set the clock manually. For details, see page 36.

Note

- To use the automatic clock setting feature, leave the cable box on.

Hookup 2 Pages 13 to 15

No cable box, or incompatible cable box with only a few scrambled channels

Recommended use

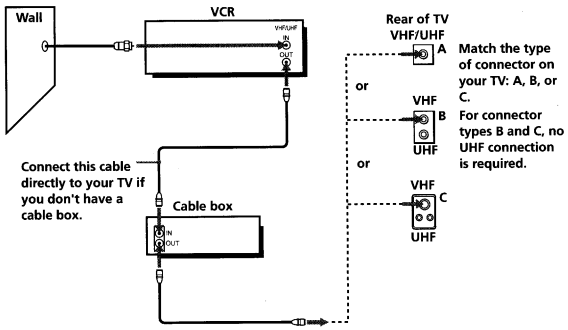
Use this hookup if you do not have a cable box. Also use this hookup if your cable company cannot supply a cable box that is compatible with the VCR's cable box control feature, and your cable system scrambles only a few channels.

What you can do with this hookup

- Record any unscrambled channel by selecting the channel on the VCR

What you can't do

- Record scrambled channels that require a cable box

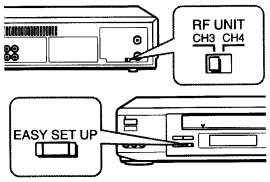


continued

Hookup 2: VCR setup

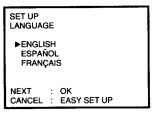
1 Set the RF UNIT switch to CH 3 or CH 4, whichever channel is not used in your area. If both are used, set the switch to either channel.

For details, see page 76.
If you made A/V connections (from page 8), you can skip this step.

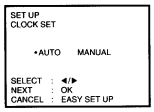


2 Press EASY SET UP on the VCR.

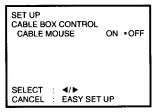
❶ The LANGUAGE menu appears. Change the on-screen display language to Spanish (ESPAÑOL) or French (FRANÇAIS) if desired, and press the joystick (OK). For details, see page 30.



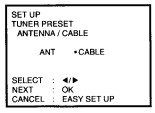
❷ The CLOCK SET menu appears. Select AUTO and press the joystick (OK). For details, see page 31.



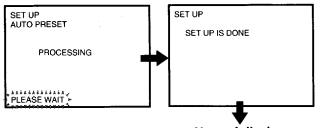
❸ The CABLE BOX CONTROL menu appears. Select OFF and press the joystick (OK).



❹ The TUNER PRESET menu appears. Set ANTENNA/CABLE to CABLE and press the joystick (OK). For details, see page 43.



❺ The AUTO PRESET starts.

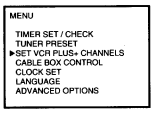


Hookup 2: VCR Plus+ channel setup

1 Find the VCR Plus+ Channel Listing in your program guide. For details, see page 47.

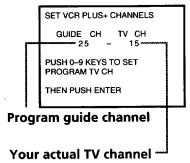
2 If the channels in the program guide are different from the channels that you actually use on your TV, set the channels that are different as follows. For details, see page 48.

❶ Press MENU and select SET VCR PLUS+ CHANNELS.



❷ Enter the program guide channel, then the channel you use on your TV.

❸ Press the joystick (OK).



Automatic clock setting

Once you've set up the VCR, it automatically sets the clock the first time you turn off the VCR. After that, whenever you turn off the VCR, it checks the time and adjusts the clock, even for Daylight Saving Time. The VCR sets the clock by picking up a time signal provided by some TV channels.

If you want to use the timer to record right away, or if the channels in your area do not carry time signals, set the clock manually. For details, see page 36.

continued

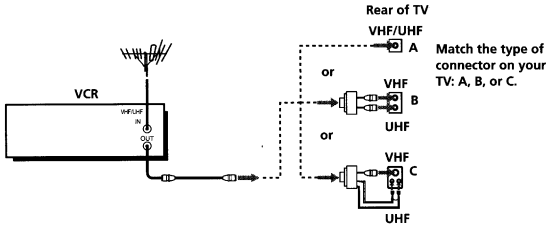
Hookup 3 — Pages 16 to 18

Antenna hookup

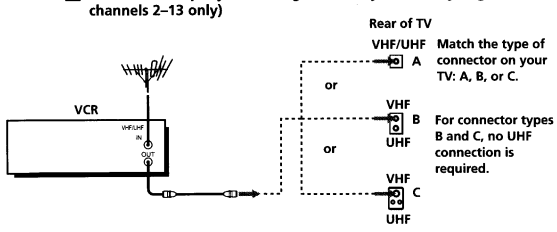
Make the following connections if you're using an antenna (if you don't have cable TV).

A Use this hookup if you're using:

- VHF/UHF antenna (you get channels 2–13 and channels 14 and higher)
- UHF-only antenna (you get channels 14 and higher)
- Separate VHF and UHF antennas



B Use this hookup if you're using a VHF-only antenna (you get channels 2–13 only)

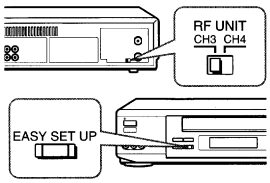


If you cannot connect your antenna cable to the VCR directly

If your antenna cable is a flat cable (300-ohm twin lead cable), attach an external antenna connector (not supplied) so that you can connect the cable to the VHF/UHF IN connector. If you have separate cables for VHF and UHF antennas, you should use a U/V band mixer (not supplied). For details, see page 77.

Hookup 3: VCR setup

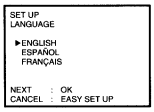
1 Set the RF UNIT switch to CH 3 or CH 4, whichever channel is not used in your area. If both are used, set the switch to either channel.



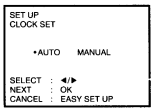
For details, see page 76. If you made A/V connections (from page 8), you can skip this step.

2 Press EASY SET UP on the VCR.

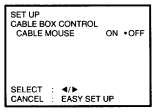
❶ The LANGUAGE menu appears. Change the on-screen display language to Spanish (ESPAÑOL) or French (FRANÇAIS) if desired, and press the joystick (OK). For details, see page 30.



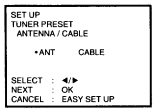
❷ The CLOCK SET menu appears. Select AUTO and press the joystick (OK). For details, see page 31.



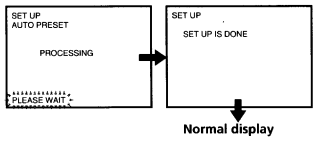
❸ The CABLE BOX CONTROL menu appears. Select OFF and press the joystick (OK).



❹ The TUNER PRESET menu appears. Set ANTENNA/CABLE to ANT and press the joystick (OK). For details, see page 43.



❺ The AUTO PRESET starts.



Normal display

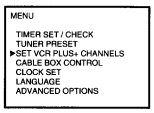
continued

Hookup 3: VCR Plus+ channel setup

1 Find the VCR Plus+ Channel Listing in your program guide. For details, see page 47.

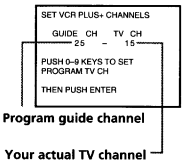
2 If the channels in the program guide are different from the channels that you actually use on your TV, set the channels that are different as follows. For details, see page 48.

❶ Press MENU and select SET VCR PLUS+ CHANNELS.



❷ Enter the program guide channel, then the channel you use on your TV.

❸ Press the joystick (OK).


SET VCR PLUS+ CHANNELS
GUIDE CH TV CH
25 – 15
PUSH 0–9 KEYS TO SET PROGRAM TV CH
THEN PUSH ENTER
Program guide channel
Your actual TV channel

Automatic clock setting

Once you've set up the VCR, it automatically sets the clock the first time you turn off the VCR. After that, whenever you turn off the VCR, it checks the time and adjusts the clock, even for Daylight Saving Time. The VCR sets the clock by picking up a time signal provided by some TV channels.

If you want to use the timer to record right away, or if the channels in your area do not carry time signals, set the clock manually. For details, see page 36.

Hookup 4 — Pages 19 to 21

Incompatible cable box with many scrambled channels

Recommended use

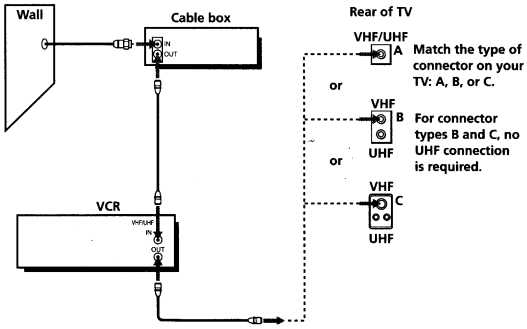
Use this hookup if your cable company cannot supply a cable box that is compatible with the VCR's cable box control feature, and your cable system scrambles all or most channels.

What you can do with this hookup

- Record any channel by selecting the channel on the cable box

What you can't do

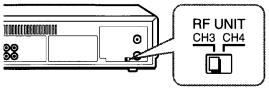
- Record with the cable box turned off
- Record one channel while watching another channel
- Select channels directly on the VCR



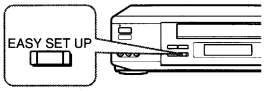
continued

Hookup 4: VCR setup

1 Set the RF UNIT switch to CH 3 or CH 4, whichever channel is not used in your area. If both are used, set the switch to either channel.



For details, see page 76. If you made A/V connections (from page 8), you can skip this step.

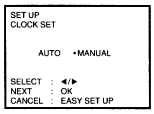


2 Turn on your cable box.

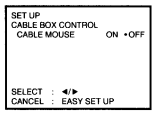
3 Press EASY SET UP on the VCR.

❶ The LANGUAGE menu appears. Change the on-screen display language to Spanish (ESPAÑOL) or French (FRANÇAIS) if desired, and press the joystick (OK). For details, see page 30.

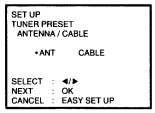
❷ The CLOCK SET menu appears. Select MANUAL, press the joystick (OK), and set the clock manually. For details, see page 36.



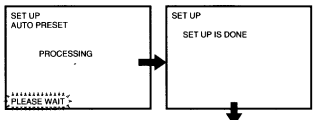
❸ The CABLE BOX CONTROL menu appears. Select OFF and press the joystick (OK).



❹ The TUNER PRESET menu appears. Set ANTENNA/CABLE to ANT and press the joystick (OK). For details, see page 43.



❺ The AUTO PRESET starts.



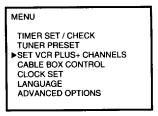
Normal display

Hookup 4: VCR Plus+ channel setup

1 Find the VCR Plus+ Channel Listing in your program guide. For details, see page 47.

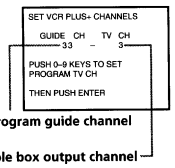
2 Enter all the channels you want to record and the cable box output channel (usually 2, 3, or 4). For details, see page 48.

❶ Press MENU and select SET VCR PLUS+ CHANNELS.



❷ Enter the program guide channel, then the cable box output channel.

❸ Press the joystick (OK).



Program guide channel

Cable box output channel

Automatic clock setting

To use the Auto Clock Set feature with this hookup, you need to manually select a channel that carries a time signal:

1 Tune the cable box to a channel that carries a time signal.

2 Select AUTO in the CLOCK SET menu to turn on the Auto Clock Set feature.

3 Turn off the VCR. It automatically sets the clock and adjusts for Daylight Saving Time by picking up the time signal.

If you want to use the timer to record right away, or if the channels in your area do not carry time signals, set the clock manually. For details, see page 36.

Note

- To use the automatic clock setting feature, leave the cable box on.

continued

Hookup 5 Pages 22 to 24

DSS (Digital Satellite System) receiver

Recommended use

Use this hookup if you have a DSS receiver. It allows the VCR's cable box control feature to control the channel on the DSS receiver, simplifying the recording process. A list of compatible DSS receivers is on page 40.

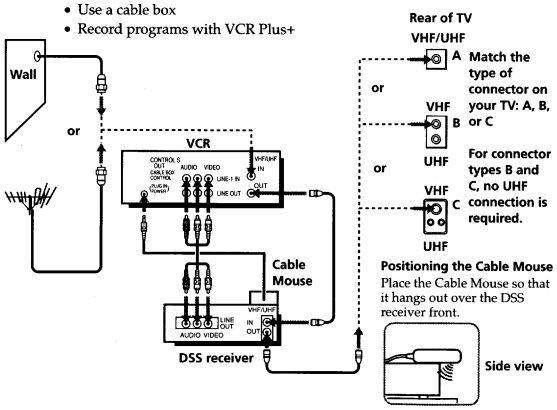
DSS (Digital Satellite System) is a satellite broadcast that provides superior digital-quality video and crisp digital-quality audio. A variety of program packages are available through your program providers. It also has program guides that are sorted by program categories.

What you can do with this hookup

- Record any channels using the VCR's cable box control feature to select channels on the DSS receiver.

What you can't do

- Record with the DSS receiver turned off
- Record any channels from cable or an antenna
  (To record channels from cable or an antenna, turn off the cable box control feature.)
- Use a cable box
- Record programs with VCR Plus+



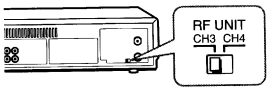
Positioning the Cable Mouse

Place the Cable Mouse so that it hangs out over the DSS receiver front.

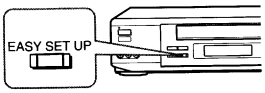
Side view

Hookup 5: VCR setup

1 Set the RF UNIT switch to CH 3 or CH 4, whichever channel is not used in your area. If both are used, set the switch to either channel.



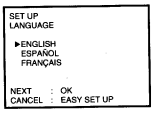
For details, see page 76. If you made A/V connections (from page 8), you can skip this step.



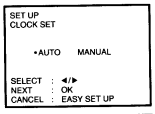
2 Turn on your DSS receiver.

3 Press EASY SET UP on the VCR.

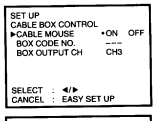
❶ The LANGUAGE menu appears. Change the on-screen display language to Spanish (ESPAÑOL) or French (FRANÇAIS) if desired, and press the joystick (OK). For details, see page 30.



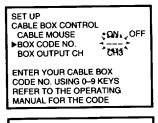
❷ The CLOCK SET menu appears. Select AUTO and press the joystick (OK). For details, see page 31.



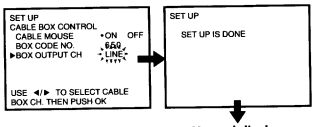
❸ The CABLE BOX CONTROL menu appears. Select ON. For details, see page 38.



❹ Enter your DSS receiver code number and push the joystick to ↓. For details, see page 39.


SET UP
CABLE BOX CONTROL
CABLE MOUSE ON OFF
►BOX CODE NO. 650
BOX OUTPUT CH CH3
ENTER YOUR CABLE BOX CODE NO. USING 0-9 KEYS REFER TO THE OPERATING MANUAL FOR THE CODE

❺ Set your DSS receiver output channel (BOX OUTPUT CH) to LINE and press the joystick (OK).


SET UP
CABLE BOX CONTROL
CABLE MOUSE •ON OFF
BOX CODE NO. 650
►BOX OUTPUT CH LINE
USE ◄/► TO SELECT CABLE BOX CH. THEN PUSH OK
SET UP
SET UP IS DONE

Normal display

Automatic clock setting

Once you've set up the VCR, it automatically sets the clock the first time you turn off the VCR. After that, whenever you turn off the VCR, it checks the time and adjusts the clock, even for Daylight Saving Time. The VCR sets the clock by picking up a time signal provided by some TV channels.

If you want to use the timer to record right away, or if the channels in your area do not carry time signals, set the clock manually. For details, see page 36.

Note

- To successfully record a program from the DSS receiver, proceed as follows:
  - Leave the DSS receiver on all the time.
  - Turn off the display (menu screen, channel number, etc.) of the DSS receiver.
  - To record or receive locked channels, unlock the channel before the VCR starts recording.
  - To set pay-per-view programs in the timer setting, order the pay-per-view program before the VCR starts recording.
  - Some programs are copy protected. You cannot record these programs.

Hookup 6 Pages 25 to 29

Incompatible cable box with only a few scrambled channels, using an A/B switch

Recommended use

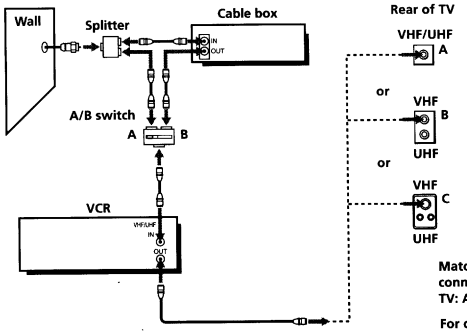
By using an A/B switch (not supplied), this hookup allows you to record both scrambled and unscrambled channels conveniently.

What you can do with this hookup

- Record any unscrambled channel by selecting the channel directly on the VCR (the A/B switch is set to A)
- Record any scrambled channel by selecting the channel on the cable box (the A/B switch is set to B)

What you can't do

- Record one scrambled channel while watching another channel (the A/B switch is set to B)



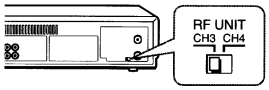
Match the type of connector on your TV: A, B, or C.

For connector types B and C, no UHF connection is required.

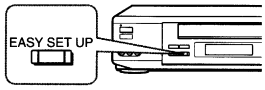
continued

Hookup 6: VCR setup

1 Set the RF UNIT switch to CH 3 or CH 4, whichever channel is not used in your area. If both are used, set the switch to either channel.



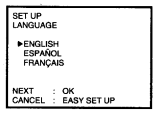
For details, see page 76. If you made A/V connections (from page 8), you can skip this step.



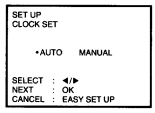
2 Set the A/B switch to "A."

3 Press EASY SET UP on the VCR.

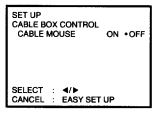
❶ The LANGUAGE menu appears. Change the on-screen display language to Spanish (ESPAÑOL) or French (FRANÇAIS) if desired, and press the joystick (OK). For details, see page 30.



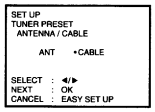
❷ The CLOCK SET menu appears. Select AUTO and press the joystick (OK). For details, see page 31.



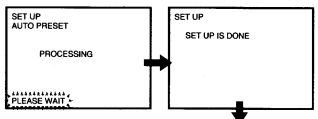
❸ The CABLE BOX CONTROL menu appears. Select OFF and press the joystick (OK).



❹ The TUNER PRESET menu appears. Set ANTENNA/CABLE to CABLE and press the joystick (OK). For details, see page 43.



❺ The AUTO PRESET starts.



Normal display

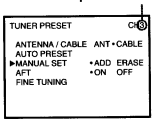
4 Preset the cable box output channel (usually 2, 3 or 4). For details, see page 45.

Cable box output channel

❶ Press MENU and select TUNER PRESET.

❷ Enter the cable box output channel.

❸ Set MANUAL SET to ADD and press the joystick (OK).



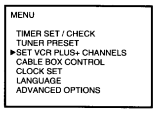
continued

Hookup 6: VCR Plus+ channel setup

1 Find the VCR Plus+ Channel Listing in your program guide. For details, see page 47.

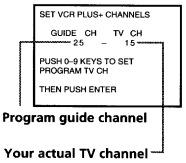
2 For unscrambled channels, if the channels in the program guide are different from the channels that you actually use on your TV, set the channels that are different as follows. For details, see page 48.

❶ Press MENU and select SET VCR PLUS+ CHANNELS.



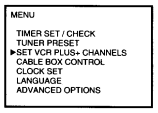
❷ Enter the program guide channel, then the channel you use on your TV.

❸ Press the joystick (OK).



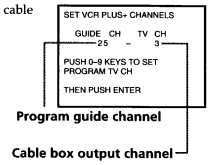
3 For scrambled channels, enter all the scrambled channels you want to record and the cable box output channel (usually 2, 3, or 4). For details, see page 48.

❶ Press MENU and select SET VCR PLUS+ CHANNELS.



❷ Enter the program guide channel, then the cable box output channel.

❸ Press the joystick (OK).



Automatic clock setting

Once you've set up the VCR, it automatically sets the clock the first time you turn off the VCR. After that, whenever you turn off the VCR, it checks the time and adjusts the clock, even for Daylight Saving Time. The VCR sets the clock by picking up a time signal provided by some TV channels.

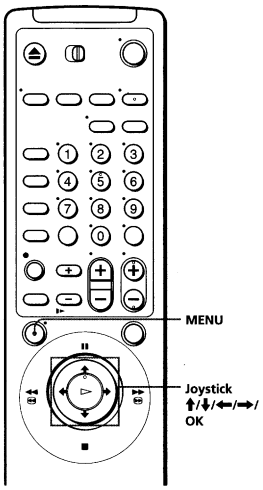
If you want to use the timer to record right away, or if the channels in your area do not carry time signals, set the clock manually. For details, see page 36.

Note

- To use the automatic clock setting feature, set the A/B switch to A.

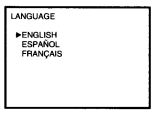
Selecting a language

You can change the on-screen display language.



1 • MENU Press MENU, then push the joystick to ↑/↓ to move the cursor (►) to LANGUAGE and press the joystick (OK).

When using the EASY SET UP procedure, skip this step.



2 Push the joystick to ↑/↓ to select ENGLISH, ESPAÑOL, or FRANÇAIS, then press the joystick (OK).

Setting the clock

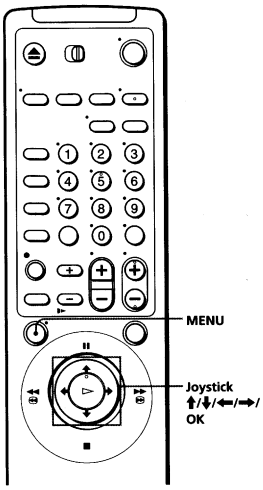
Using the Auto Clock Set feature

Some TV and cable channels transmit time signals with their broadcasts. Your VCR can pick up this time signal to automatically set the clock.

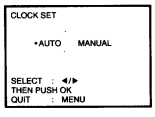
The Auto Clock Set feature works only if a channel in your area is broadcasting a time signal. If broadcasters in your area are not yet sending time signals, set the time manually (page 36).

Before you start...

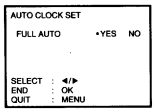
- Turn on the VCR and the TV.
- Set the TV to the VCR channel (channel 3 or 4). If your TV is connected to the VCR using A/V connections, set the TV to video input.
- Press TV/VIDEO to display the VIDEO indicator in the VCR's display window.
- Press INPUT SELECT so that a channel number appears in the VCR's display window.



1 • MENU Press MENU, then push the joystick to ↑/↓ to move the cursor (►) to CLOCK SET and press the joystick (OK).



2 Push the joystick to ←/→ to select AUTO, then press the joystick (OK).



continued

3 Push the joystick to ⬅/➡ to select YES, then press the joystick (OK).

4 To activate the Auto Clock Set function, turn off the VCR.

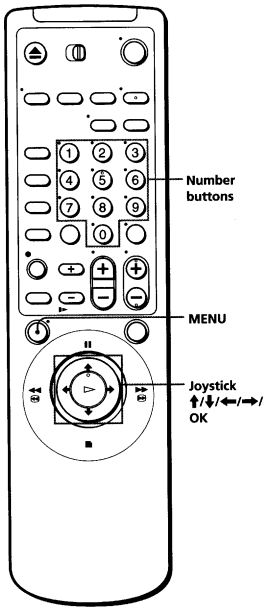
The VCR automatically sets the clock by searching for a channel that carries a time signal and sets your time zone and Daylight Saving Time (if applicable).

If your clock is set to the wrong time zone or Daylight Saving Time, you can adjust these settings without turning off the Auto Clock Set feature (page 33).

Notes

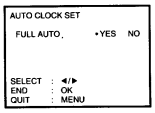
- The clock cannot be set automatically if you don't receive a channel that carries a time signal in your area. If so, set the clock manually.
- If there are only a few channels in your area that carry time signals, setting the clock automatically may take up to about 30 minutes. If nothing happens even after you wait about 30 minutes, set the clock manually.
- If you use Hookup 1, make sure you leave the cable box on.

If the clock is not activated



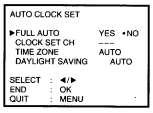
1 Follow steps 1 and 2 in "Using the Auto Clock Set feature."

The AUTO CLOCK SET menu is displayed.



continued

2 Push the joystick to ⬅/➡ to select NO for FULL AUTO.



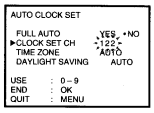
3 Push the joystick to ↑/↓ to move the cursor (▶) to the item you want to set, then push the joystick to ⬅/➡ to make the setting.

- For CLOCK SET CH

  Leave the setting to "– –" to have the VCR automatically search for a channel that carries a time signal.

  Press the number buttons to select a channel that carries a time signal.

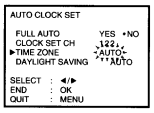
  Use this option if you know of a channel that carries a time signal. Most PBS member stations broadcast a time signal. For the fastest response, select your local PBS station.



- For TIME ZONE

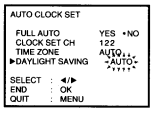
  Select the time zone of your area, or select AUTO to have the VCR automatically set your time zone.

  The options are: AUTO → ATLANTIC → EASTERN → CENTRAL → MOUNTAIN → PACIFIC → ALASKA → HAWAII → AUTO



- For DAYLIGHT SAVING

  Select ON or OFF (standard time), or AUTO to have the VCR automatically set the daylight saving time.



4 Press the joystick (OK).

5 To activate the Auto Clock Set function, turn off the VCR.

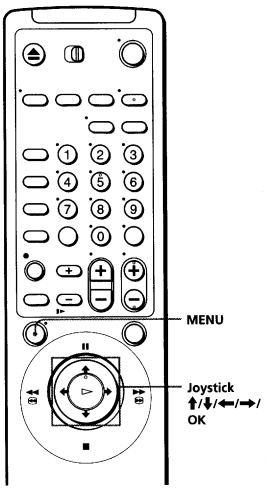
Note

- If you use both the cable box control feature and the Auto Clock Set feature, the VCR automatically changes channels on the cable box until a channel that carries a time signal is found, whenever you turn off the VCR.

  If you want to stop the search, change the channel on the cable box with the channel buttons either on the VCR or on the remote commander.

continued

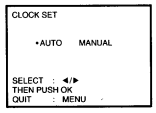
Using Manual clock set



1 MENU, PLAY/OK

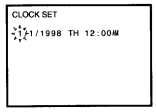
Press MENU, then push the joystick to ↑/↓ to move the cursor (▶) to CLOCK SET and press the joystick (OK).

When using the EASY SET UP procedure, skip this step.



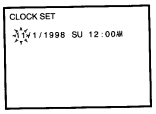
2 PLAY/OK

Push the joystick to ←/→ to select MANUAL and press the joystick (OK).



3 PLAY/OK

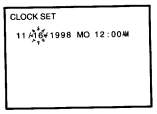
Push the joystick to ↑/↓ to set the month.



4 PLAY/OK

Push the joystick to → to flash the day and push the joystick to ↑/↓ to set the day.

The day of the week is set automatically.



5 PLAY/OK

Set the year, hour and minutes in the same way as the day.

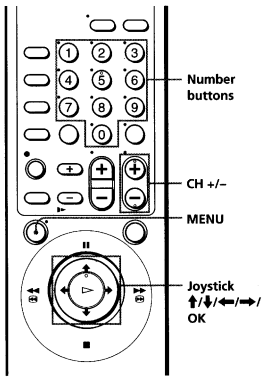
6 PLAY/OK

Press the joystick (OK) to start the clock.

Setting up cable box control

(Skip this section if you are using Hookup 2, 3, 4, or 6.)

Your VCR includes a cable box control feature that allows the VCR to control most brands of cable boxes/DSS receivers via the Cable Mouse. With cable box control, the VCR controls channels on the cable box/DSS receiver for timer recording. You can also use the VCR's remote commander to change channels on the cable box/DSS receiver whenever the cable box/DSS receiver is turned on even if the VCR is turned off. To use cable box control, you need to connect the Cable Mouse (pages 10 and 22) and set the code number and output channel.

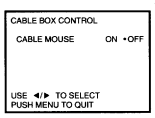


This VCR is programmed with codes necessary to control channel selection on most brands of cable boxes at the time this VCR was manufactured. It is possible that new cable boxes may be introduced that cannot be controlled with this VCR's Cable Mouse. If you have a cable box that is incompatible with this VCR, contact your cable operator — they may be able to provide you with a compatible cable box.

1 MENU, PLAY/OK

Press MENU, then push the joystick to ↑/↓ to move the cursor (▶) to CABLE BOX CONTROL and press the joystick (OK).

When using the EASY SET UP procedure, skip this step.

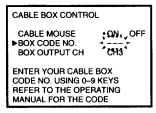


2 PLAY/OK

Push the joystick to ←/→ to select ON, then push the joystick to ↓.

"– – –" flashes in the BOX CODE NO. row.

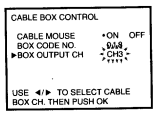
If a code number has already been entered, push the joystick to ↓ to select BOX CODE NO.


CABLE BOX CONTROL
CABLE MOUSE ON OFF
▶BOX CODE NO.
BOX OUTPUT CH CH3
ENTER YOUR CABLE BOX CODE NO. USING 0-9 KEYS
REFER TO THE OPERATING MANUAL FOR THE CODE

3 0–9, PLAY/OK

Press the number buttons to enter the cable box/DSS receiver code number, then push the joystick to ↓.

Find your cable box/DSS receiver code number from the chart below.



4 PLAY/OK

If you want to control a cable box, push the joystick to ←/→ to select the output channel for the cable box, then press the joystick (OK).

If you want to control a DSS receiver, select LINE, then press the joystick (OK).

Cable box and DSS receiver brand and the corresponding code numbers

If more than one code number is listed, try entering them one by one, until you come to the correct code for your equipment.

Cable box brand	Code numbers
ABC	018, 022, 024, 028, 217
Antronix	218
Archer	033, 050, 164, 218, 808
BBT	278
Cable Star	067
Cabletenna	033
Cable time	172, 388, 459
Century	164
Citizen	164, 326, 327
Clyde Cablevision	097
Colour Voice	036, 042
Comband	243, 244
Comtronics	051, 071
Decsat	434
Diamond	046
Eagle Comtronics	051

Cable box brand	Code numbers
Eastern	013, 285
Electricord	089
Electus	055
Focus	411
Garrard	164
GC Electronics	027, 067, 341
GE	243, 244
GEC	097
Gemini	026, 068, 081
General Instrument	022, 287, 487
Hamlin	020, 031, 045, 270, 284
Hitachi	022
Jasco	164, 326
Jerrold	014, 022, 025, 026, 035, 037, 058, 109, 287, 487
Linsay	451

continued

Setting up cable box control (continued)

Cable box brand	Code numbers
Macom	044
Magnavox	038, 043, 080
Memorex	011
Movie Time	089, 167, 214
Northcoast	325
Novaplex	629
NSC	074, 081, 167, 214
Oak	018, 030, 259
Panasonic	032, 118
Paragon	011
Philips	036, 038, 039, 040, 041, 042, 071, 301
Pioneer	034, 155, 271, 544, 695
Popular Mechanics	411
Pulsar	011
Radio shack	808
RCA	032
Realistic	218
Recoton	411
Regal	031, 270, 284, 290
Regency	013
Rembrandt	081
Samsung	051, 155
Scientific Atlanta	017, 019, 028, 288
Seam	521
Sharp	324
Signal	051
Signature	022
SL Marx	051
Spectravision	069
Sprucer	032, 318
Standard Components	107, 166
Starcom	014, 026, 058, 109
Stargate	026, 051

Cable box brand	Code numbers
STS	167
Sylvania	012
T-Cable Teletext	116
Tandy	269
Tatung	108
Teknica	157
TeleCaption	232
Teleservice	292
Texscan	012, 107
TFC	321
Timeless	429
Tocom	023, 024
Toshiba	011
Tudi	297
TV86	074
TV COM	018, 030, 259
Uniden	236
Unika	033, 164, 218
United Artists	018
United Cable	014
Universal	033, 050, 067, 088, 089, 164, 202, 218, 333
Videoway	261
Vidtech	255
Viewstar	038, 071, 074, 122, 222, 269, 300
Zenith	011, 065, 536
Zentek	411
Wave Master	576

DSS receiver brand	Code numbers
RCA	577
Sony	650

Setting up cable box control (continued)

If you cannot get your VCR to control the cable box/DSS receiver

- Check that the Cable Mouse is connected to the CABLE BOX CONTROL jack on the VCR.
- Check the position of the Cable Mouse.
- Place the cable box/DSS receiver and VCR away from each other. Do not place the cable box/DSS receiver on top of the VCR.
- Try the setup again making sure to use the correct control code. If the cable box still does not respond, try the other codes that are listed.

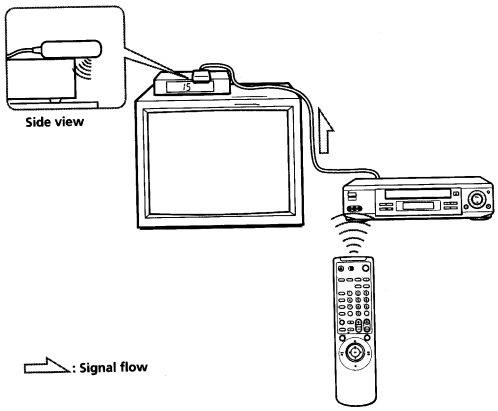
If your cable box still does not operate with the Cable Mouse, contact your cable company to see if they can provide you with a compatible cable box.

Note

- Make sure you turn off the VCR when you plug in or unplug the Cable Mouse. If you unplug the Cable Mouse and plug it in again, turn on the VCR before you use the cable box/DSS receiver control feature.

To ensure correct operation

- Place the Cable Mouse so that it hangs out over the cable box/DSS receiver front.
- Do not place the cable box/DSS receiver on top of the VCR.
- Position the cable box/DSS receiver away from the VCR.
- Point the remote commander at the VCR, not at the cable box/DSS receiver.



To check the cable box control setting

1 Press CH +/– on the remote commander. Does the channel indicator on the cable box/DSS receiver change? (Point the remote commander at the VCR, not at the cable box/DSS receiver.)

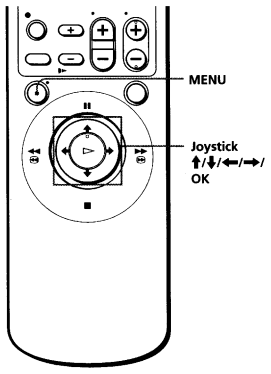
2 Press all 10 number buttons (0 to 9) on the remote commander. Does the channel indicator on the cable box/DSS receiver change?

If the answer to both 1 and 2 is "yes," you have made the correct setting.

continued

Presetting channels

(Skip this section if you are using cable box/DSS receiver control.)



This VCR is capable of receiving VHF channels 2 to 13, UHF channels 14 to 69 and unscrambled CATV channels 1 to 125. First, we recommend that you preset the receivable channels in your area using automatic presetting. Then, if there are any unwanted channels, disable them manually. If you have decided which channels you wish to preset, set them directly using manual presetting.

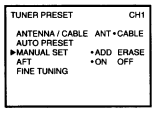
Before you start...

- Turn on the VCR and the TV.
- Set the TV to the VCR channel (channel 3 or 4). If your TV is connected to the VCR using A/V connections, set the TV to video input.
- Press TV/VIDEO to display the VIDEO indicator in the VCR's display window.

Presetting all receivable channels automatically

1 MENU Press MENU, then push the joystick to ↑/↓ to move the cursor (▶) to TUNER PRESET and press the joystick (OK).

When using the EASY SET UP procedure, skip this step.



2 Push the joystick to ↑/↓ to select ANTENNA/CABLE.

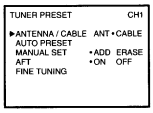
continued

Presetting channels (continued)

3

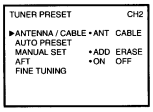
• To preset cable TV channels:

Push the joystick to ⬅/➡ to set ANTENNA/CABLE to CABLE.



• To preset VHF and UHF channels:

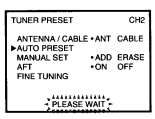
Push the joystick to ⬅/➡ to set ANTENNA/CABLE to ANT.



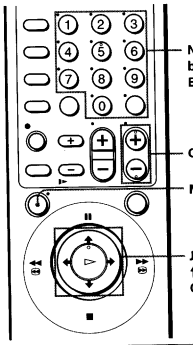
4

Push the joystick to ⬆/⬇ to select AUTO PRESET, then press the joystick (OK).

All receivable channels are preset in numerical sequence. When no more receivable channels can be found, presetting stops and the picture from the lowest numbered channel is displayed on the TV screen.



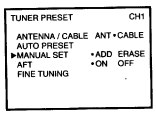
Presetting/disabling channels manually



1

• MENU

Press MENU and select TUNER PRESET, then press the joystick (OK).

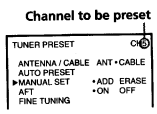


2

• To preset a channel:

1 Press the number buttons to enter the channel number, then press ENTER.
2 Push the joystick to ⬅/➡ to set MANUAL SET to ADD.

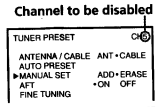
Channel to be preset



• To disable a channel:

1 Press CH +/– to select the channel number.
2 Push the joystick to ⬅/➡ to set MANUAL SET to ERASE.

Channel to be disabled



3

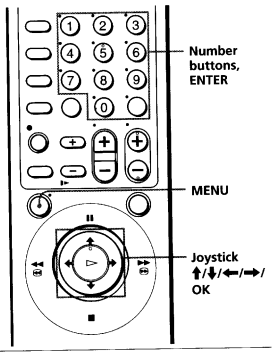
Repeat step 2 to preset or disable channels as required, then press the joystick (OK).

continued

Presetting channels (continued)

If the picture is not clear

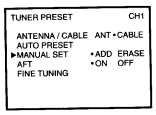
Normally, the Auto Fine Tuning (AFT) function automatically tunes in channels clearly. If, however, the picture of a channel is not clear, you can also use the manual tuning function.



1

• MENU

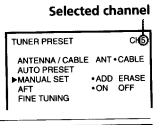
Press MENU and select TUNER PRESET, then press the joystick (OK).



2

Press the number buttons to select the channel you want to fine-tune, then press ENTER.

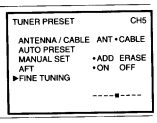
Selected channel



3

Push the joystick to ⬆/⬇ to select FINE TUNING.

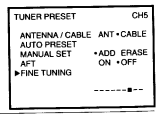
The fine tuning meter appears.



4

Push the joystick to ⬅/➡ to adjust to a clearer picture, then press the joystick (OK).

Note that the AFT setting switches to OFF.

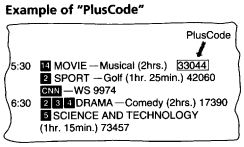


Setting up VCR Plus+

How VCR Plus+ works

Whenever you want to record a TV program, all you need to do is look up the program's "PlusCode," a number assigned to each program that's published in the TV section of most newspapers, cable TV listings, and even *TV GUIDE* magazine. Then, just enter the PlusCode of the program you want and the VCR is automatically programmed to record that show. It's that simple.

Example of "PlusCode"



How to set up your VCR

Setting up your VCR involves coordinating the TV channel number (the number you turn to on your TV or VCR to watch a program) with the guide channel (the number that's assigned to that channel in your program guide). To get the guide channel numbers, find the "Channel Line-up Chart" in the program guide for your area that features VCR PlusCodes. It usually looks like the example to the right.

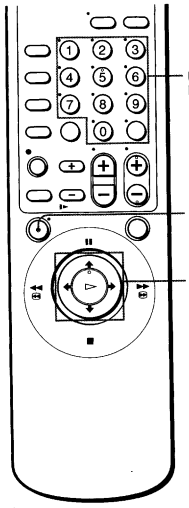
For each channel your VCR receives, use the Channel Line-up Chart to check that the channel numbers match. For example, if HBO is listed in the Channel Line-up Chart on channel 33, and your VCR receives HBO on channel 5, you need to coordinate these numbers using the following procedure. For channels in which the numbers are the same, you can skip this procedure.

Example of "Channel Line-up Chart"

CABLE CH	CABLE TV	VCR Plus+ GUIDE CH
16	AMC American Movie Classics	35
17	BRV Bravo (program grid only)	54
20	CNN Cable News Network	42
21	CSP C-SPAN	28
22	DIS The Disney Channel	53
25	DSC The Discovery Channel	37
34	ESN ESPN	34
35	FAM The Family Channel	47
5	HBO Home Box Office	33
27	LIF Lifetime	46
29	MAX Cinemax	45
30	MTV Music Television	48
31	NIK Nickelodeon	38
38	SC Sports Channel	59
39	SCA Sports Channel America	70
45	SHO Showtime	41
17	TBS TBS SuperStation	43
44	TMC The Movie Channel	58
49	TNN The Nashville Network	49
50	TNT Turner Network Television	52
51	USA USA Network	44

continued

Setting up VCR Plus+ (continued)



1 MENU Press MENU, then push the joystick to ↑/↓ to move the cursor (▶) to SET VCR PLUS+ CHANNELS and press the joystick (OK).

SET VCR PLUS+ CHANNELS
GUIDE CH TV CH
PUSH 0–9 KEYS TO SET PROGRAM GUIDE CH
OR PUSH OK TO SEE VCR PLUS+ CHANNEL LIST

2 Enter the channel number assigned in the program guide and press ENTER.

SET VCR PLUS+ CHANNELS
GUIDE CH TV CH
PUSH 0–9 KEYS TO SET PROGRAM GUIDE CH
THEN PUSH ENTER

3 • If you made Hookup 1, 2 or 3: Enter the actual number on your TV (and VCR) and press ENTER.
• If you made Hookup 4: Enter the cable output channel (usually 2, 3 or 4) and press ENTER.
• If you made Hookup 6: Enter the actual number on your TV (and VCR) for an unscrambled channel and press ENTER. For a scrambled channel, enter the cable box output channel (usually 2, 3, or 4) and press ENTER.

SET VCR PLUS+ CHANNELS
GUIDE CH TV CH
33 –
PUSH 0–9 KEYS TO SET PROGRAM TV CH
THEN PUSH ENTER

SET VCR PLUS+ CHANNELS
GUIDE CH TV CH
33 –
PUSH 0–9 KEYS TO SET PROGRAM TV CH
THEN PUSH ENTER

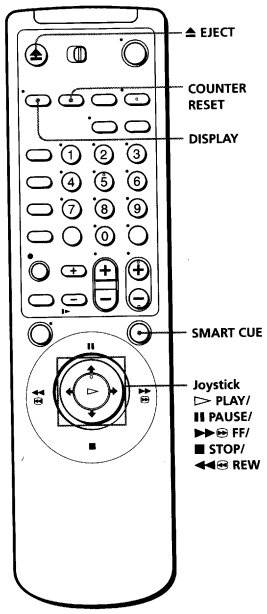
4 Repeat steps 2 and 3 for each channel whose numbers don't match.

5 When you have set all channels, press the joystick (OK) to confirm your channel settings.

VCR PLUS+ CHANNEL LIST
PAGE 1
GUIDE TV ■ GUIDE TV
2 – 73 ■ 59 – 47
5 – 4 ■ 61 – 3
17 – 55 ■ 77 – 35
28 – 9 ■ 86 – 120
33 – 5 ■ 90 – 22
USE ◀/▶ TO CHANGE PAGE
PUSH MENU TO QUIT

6 MENU When you've finished, press MENU to exit.

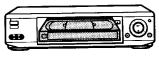
Playing a tape



1 Turn on your TV and set it to the video channel.

2 Insert a tape.

The VCR turns on and starts playing automatically if you insert a tape with its safety tab removed.



3 Press the joystick ▷.

When the tape reaches the end, it will rewind automatically.

Additional tasks

To	Push the joystick to
Stop play	■ STOP
Pause play	❚❚ PAUSE
Resume play after pause	❚❚ PAUSE or press the joystick ▷.
Fast-forward the tape	▶▶⏩ FF during stop
Rewind the tape	◀◀⏪ REW during stop
Eject the tape	Press ⏏ EJECT.

To skip playback

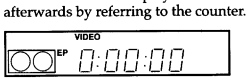
You can skip a portion of playback you don't want to watch such as a commercial and restart playback by pressing a single button.

Press SMART CUE during playback of a scene you want to skip. The VCR starts searching.

Press SMART CUE again when you find the scene you want to watch. The VCR stops searching, rewinds a few seconds, then resumes normal playback.

To use the time counter

At the point on the tape that you want to find later, press COUNTER RESET. The counter in the display window resets to "0:00:00." Search for the point afterwards by referring to the counter.

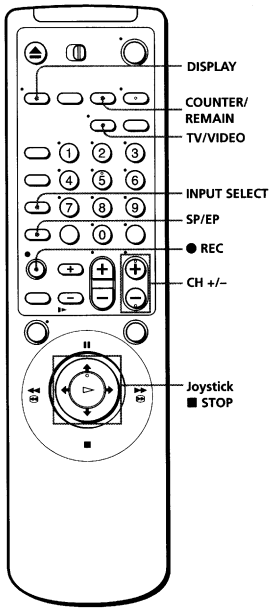


To display the counter on the TV screen, press DISPLAY.

Notes

- Tapes recorded in the LP mode on other VCRs can be played back on this VCR but the picture quality cannot be guaranteed.
- While setting the menu on the TV screen, you cannot use the joystick for tape operation.
- The counter resets to "0:00:00" whenever a tape is reinserted.
- The counter stops counting when it comes to a portion with no recording.

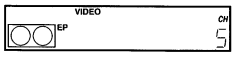
Recording TV programs



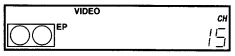
1 Turn on your TV and set it to the video channel.
To record from a cable box, turn it on.

2 Insert a tape with its safety tab in place.

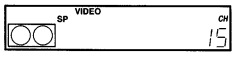
3 INPUT SELECT
Press INPUT SELECT until a channel number appears in the display window.



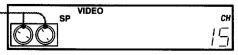
4 •CH
Press CH +/– to select the channel you want to record.



5 SP / EP
Press SP/EP to select the tape speed, SP or EP.
EP (Extra Play) provides recording time three times as long as SP (Standard Play), however, SP produces better picture and audio quality.



6 ●REC
Press ● REC to start recording.
The recording indicator lights up red in the display window.



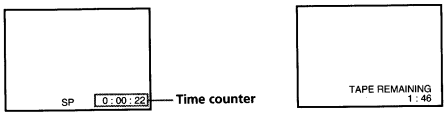
To stop recording
Push the joystick to ■ STOP.

continued

Recording TV programs (continued)

To check the remaining time

Press DISPLAY. With the display on, press COUNTER/REMAIN to check the remaining time. Each time you press COUNTER/REMAIN, the time counter and the remaining time appear alternately. The remaining time indicator also appears in the display window.



To check the remaining time of a T-140 or T-180 tape, set TAPE SELECT in the ADVANCED OPTIONS menu to "180." (For details, see page 73.)

To watch another TV program while recording

1. Press TV/VIDEO to turn off the VIDEO indicator in the display window.
2. If the TV is connected to the VCR's LINE OUT jacks, set the TV to TV input; if not, skip this step.
3. Select another channel on the TV.

To select the channel using the shuttle ring

To select a channel in step 4 on page 53, you can also use the shuttle ring. During stop, turn the shuttle ring clockwise for higher channels or counterclockwise for lower channels. The VCR switches the channel in the preset order.

To save a recording

To prevent accidental erasure, break off the safety tab as illustrated. To record on a tape again, cover the tab hole with adhesive tape.

Tips

- To select a channel, you can use the number buttons on the remote commander. Enter the channel number, then press ENTER.
- You can select a video source from the LINE-1 IN or LINE-2 IN jacks using INPUT SELECT.
- The display appears on the TV screen indicating information about the tape, but the information won't be recorded on the tape.
- If you don't want to watch TV while recording, you can turn off the TV. When using a cable box, make sure to leave it on.

Notes

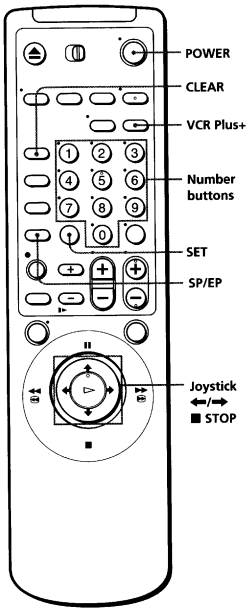
- The remaining time may not be indicated accurately for:
  - short tapes less than T-20
  - T-130
  - T-210
  - tapes recorded in the LP mode.
- The display doesn't appear during still (pause) mode, search mode, or slow-motion playback.
- It may take up to one minute for the VCR to calculate and display the remaining time after you press DISPLAY.

Recording TV programs using VCR Plus+

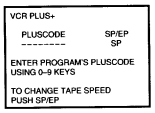
Just enter the program's PlusCode listed in the TV program guide. The date, times and channel number of that program are set automatically. You can preset up to eight programs at a time.

Before you start...

- Check that the VCR clock is set to the correct time.
- Turn on your TV and set it to the video channel. When using a cable box, turn it on.
- Insert a tape with its safety tab in place. Make sure the tape is longer than the total recording time.

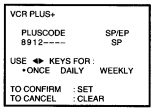


1 VCR Plus+ Press VCR Plus+.

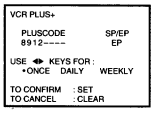


2 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⓪ Press the number buttons to enter the program's PlusCode.

If you make a mistake, press CLEAR and re-enter the correct number.

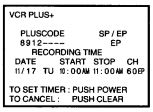


3 SP / EP Press SP / EP to select the tape speed, SP or EP.



4 PLAY ▷ OK / SET Push the joystick ←/→ to select ONCE, DAILY, or WEEKLY, then press SET:

To record	Select
Only once	ONCE
Everyday Monday to Friday	DAILY
Once a week	WEEKLY



The date, start and stop times, channel number and tape speed appear on the TV screen. If the information is not correct, press CLEAR to cancel the setting.

5 To enter another setting, repeat steps 1 to 4.

6 • POWER Press POWER to turn off the VCR.

The ◴ indicator appears in the display window and the VCR stands by for recording. When using a cable box, leave it on.

To stop recording

To stop the VCR while recording, push the joystick to ■ STOP.

continued

Recording TV programs using VCR Plus+ (continued)

To use the VCR after setting the timer

To use the VCR before a timer recording begins, just press POWER. The ◴ indicator turns off and the VCR switches on. Remember to press POWER to reset the VCR in timer recording standby after using the VCR.

You can also do the following tasks while the VCR is recording:

- Reset the counter.
- Display tape information on the TV screen.
- Check the timer settings.
- Watch another TV program.

To lock the VCR after setting the timer (Child Lock)

While the VCR turns on, hold POWER down on the VCR until the 🔑 indicator appears in the display window. The VCR turns off and the 🔑 indicator remains lit. The VCR will not work except for timer recording.

To unlock the VCR, hold POWER down on the VCR until the 🔑 indicator disappears from the display window. The VCR is unlocked and turns on.

To stop timer recording while the VCR is locked, press ■ STOP. The recording stops and the VCR is unlocked.

Tip

- To cancel the VCR Plus+ recording, press VCR Plus+ before pressing SET in step 4 on page 57.

Note

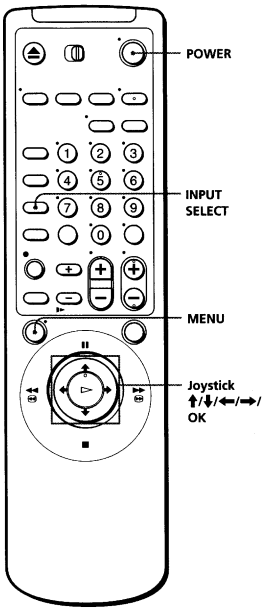
- If the VCR doesn't accept the PlusCode, this means that:
  - The PlusCode is incorrect.
  - ONCE, DAILY, or WEEKLY was selected incorrectly. You cannot select DAILY or WEEKLY for a program that airs more than seven days ahead.

Setting the timer manually

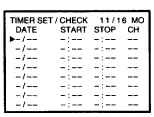
If VCR Plus+ is not available in your area, follow the instructions below to set the timer to record programs.

Before you start...

- Check that the VCR clock is set to the correct time.
- Turn on your TV and set it to the video channel. When using a cable box, turn it on.
- Insert a tape with its safety tab in place. Make sure the tape is longer than the total recording time.



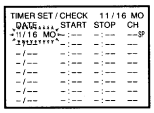
1 • MENU PLAY ▷ OK Press MENU and select TIMER SET / CHECK, then press the joystick (OK).



continued

Setting the timer manually (continued)

2 Set the date, start and stop times, channel number and tape speed:



1 Push the joystick to ➡ to flash each item in turn.

2 Push the joystick to ⬆/⬇ to set each item.

To correct a setting, push the joystick to ⬅ to return to that setting and reset.

To record the same program every day or the same day every week, push the joystick to ⬇ while the date is flashing. For details, see "Daily/weekly recording" on this page.

INPUT SELECT

To record from a source connected to the LINE 1 IN or LINE 2 IN jacks, press INPUT SELECT to display "L1" or "L2" in the "CH" position.

3 Push the joystick to ➡ to confirm the setting.

The cursor (▶) appears at the beginning of the line. To enter another setting, move the cursor to the next line and repeat step 2.

4 Press the joystick (OK).

5 • POWER

Press POWER to turn off the VCR.

The ⏲ indicator appears in the display window and the VCR stands by for recording. When using a cable box, leave it on.

Daily/weekly recording

In step 2 above, push the joystick to ⬇ to select the recording pattern. Each time you push the joystick to ⬇, the indication changes as shown below. Push the joystick to ⬆ to change the indication in reverse order.

the current date → SU-SA → MO-SA → MO-FR → EVERY SA → ..... → EVERY MO → EVERY SU → 1 month later → (dates count down) → the current date

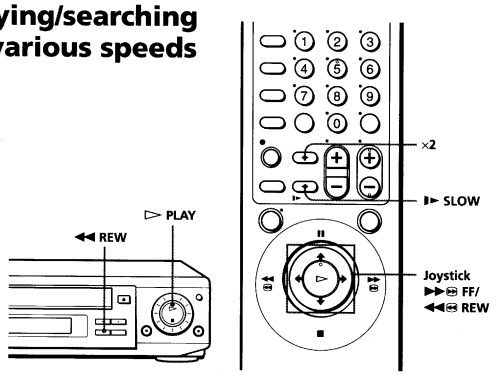
Tips

- To set the channel, you can also use the CH+/−, number buttons, or shuttle ring during stop.
- To set the tape speed, you can also use SP/EP.

Note

- If you are using cable box control, you cannot select "L1" or "L2".

Playing/searching at various speeds



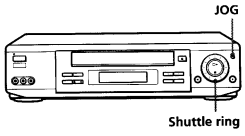
Playback options	Operation
View the picture during fast-forward or rewind	During fast-forward, keep pushing the joystick to ▶▶ FF. During rewind, keep pushing the joystick to ◀◀ REW.
Play at high speed	• During playback, push the joystick to ▶▶ FF or ◀◀ REW on the remote commander. • During playback, keep pushing the joystick to ▶▶ FF or ◀◀ REW. When you release the joystick, normal playback resumes.
Play at twice the normal speed	During playback, press ×2.
Play in slow motion	During playback or pause, press ▮► SLOW.
Play frame by frame	During pause, push the joystick to ▶▶ FF or ◀◀ REW. Keep pushing the joystick to play one frame each second.
Rewind and start play	During stop, hold ◀◀ REW on the VCR, and press ▷ PLAY on the VCR.

continued

Playing/searching at various speeds (continued)

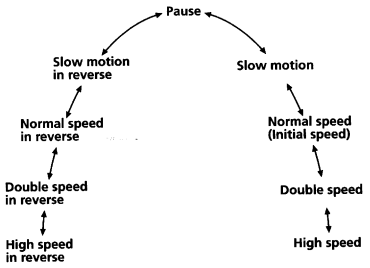
Using the shuttle ring on the VCR

With the shuttle ring on the VCR, you can operate a variety of playback options. There are two ways for using the shuttle ring, normal mode and jog mode.



To use the shuttle ring in normal mode

During playback or pause, turn the shuttle ring clockwise or counterclockwise. Each change in the shuttle ring position changes the playback mode in the following way.



To use the shuttle ring in jog mode

Use this mode for frame-by-frame playback.

Press JOG to enter the jog mode. The JOG button lights up. If you change to the jog mode during any playback mode, the playback pauses so you can see a still picture. Each change in the shuttle ring position shifts the picture one frame. To shift frames in reverse, turn the shuttle ring counterclockwise. The frame shift speed depends on the speed you turn the shuttle ring. To resume normal playback, press JOG again. The JOG indicator goes off.

To resume normal playback

Press the joystick ▷.

Tip

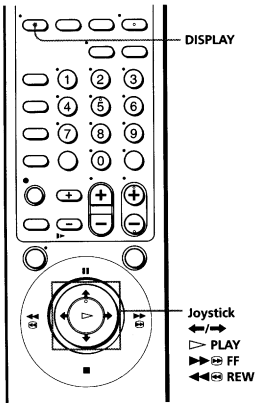
- Adjust the picture using the TRACKING +/− buttons on the VCR if:
  - Streaks appear while playing in slow motion.
  - The picture shakes while pausing.

Notes

- The sound is muted during these operations.
- Tapes recorded in the LP mode on other VCRs can be played back on this VCR but the picture quality cannot be guaranteed.
- The picture may have snow:
  - when playing at high speed in reverse
  - when playing in reverse slow motion
  - when playing in reverse.
- On screen symbols, such as the bar indication, may shake while playing or searching at various speeds.

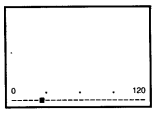
Searching for a selected point on the tape

You can easily find a selected point by moving the pointer on the TV screen. The VCR fast-forwards or rewinds to the point you indicate and starts playback automatically.



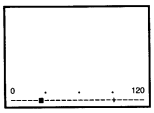
1 Press DISPLAY repeatedly until the bar indication appears on the TV screen.

A cursor (■) indicating the current position of the tape appears on the bar indication. If the cursor does not appear, play the tape a few moments (by pushing the joystick to ▷ PLAY, ▶▶ FF or ◀◀ REW) until the cursor appears.



2 Push the joystick to ←/→ to move the pointer (+) to the point where you want to start playback.

The VCR starts searching and the cursor (■) moves toward the pointer. When the VCR locates the marked point, playback starts.



To cancel searching

Push the joystick to ▷ PLAY or STOP ■.

To turn off the bar indication

Press DISPLAY again.

Notes

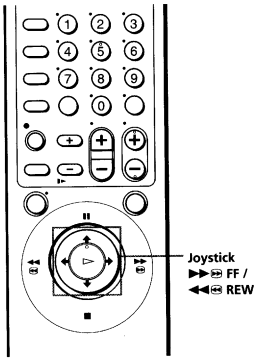
- The figure on the bar indication represents the total time length of the inserted tape as shown below.
  The total time length may not be displayed correctly for:
  – tapes other than T-60, T-120, or T-160
  – tapes recorded in more than one tape speed mode.

Tape type	Total time length		
	SP	LP	EP
T-60 or shorter	60	120	180
from T-80 to T-140	120	240	360
T-160 or longer	160	320	480

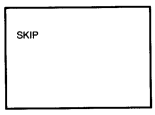
- If you move the pointer (+) on the bar indication during search, the VCR searches for the new reset point.
- While the cursor (■) is displayed on the bar indication, the joystick (▶▶ FF/➡ and ◀◀ REW/⬅) on the remote commander work only for moving the pointer (+), while the ▶▶ FF and ◀◀ REW buttons on the VCR work for normal tape operation. Note, however, if you press these buttons on the VCR, searching is canceled.

Skip-searching automatically

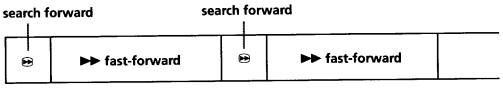
You can spot check a whole tape quickly. At intervals, the VCR skips playback while searching forward or backward.



Push the joystick to ▶▶ FF (or ◀◀ REW) for two seconds during stop.
"SKIP" indicator appears on the TV screen.



The VCR searches forward (or backward) for two minutes on the counter, then fast-forwards (or rewinds) for ten minutes on the counter. The VCR repeats this operation until it stops at the end (or beginning) of the tape.



To cancel skip-search

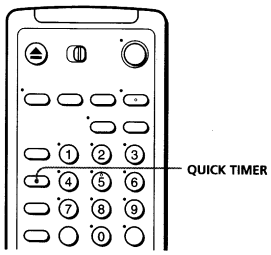
Push the joystick to ▷ PLAY or ■ STOP.

Note

- The VCR automatically fast-forwards (or rewinds) any portion with no recording.

Recording TV programs using the quick timer

After starting recording in the normal way, you can have the VCR stop recording automatically after a specified duration.

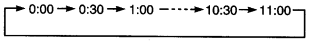


1 While recording, press QUICK TIMER once.

The ◴ indicator appears in the display window.

2 Press QUICK TIMER repeatedly to set the duration.

Each press advances the time in increments of 30 minutes.



The duration decreases minute by minute to 0:00, then the VCR stops recording and turns off automatically.

To extend the duration

Press QUICK TIMER repeatedly to set to the new duration.

To stop the VCR while recording

Push the joystick to ■ STOP.

Using the quick timer during stop mode

1 Press QUICK TIMER.

2 Press CH +/– or INPUT SELECT to select the channel you want to record.

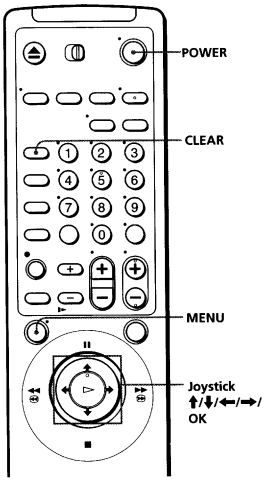
3 Press QUICK TIMER repeatedly to set the recording duration.

The recording starts.

Checking/ changing/ canceling timer settings

Before you start...

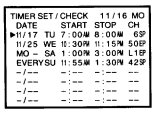
- Turn on your TV and set it to the video channel.



1 Press POWER to turn on the VCR.

2 Press MENU and select TIMER SET / CHECK:

- If you want to change a setting, go on to the next step.
- If you do not need to change the settings, press the joystick (OK), then turn off the VCR to return to recording standby.


TIMER SET / CHECK 11/16 MO
DATE START STOP CH
▶11/17 TU 7:00M 8:00M 6SP
11/25 WE 10:30M 11:15M 50P
MO – SA 1:00M 3:00M L1P
EVERY SU 11:55M 1:30M 42SP
–/– –:– –:– ––
–/– –:– –:– ––
–/– –:– –:– ––
–/– –:– –:– ––

3 Push the joystick to ↑/↓ to select the setting you want to change or cancel:

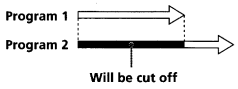
- To change the setting, push the joystick to ←/→ to flash the item you want to change, and push the joystick to ↑/↓ to reset it. Then, push the joystick to → repeatedly until the cursor (▶) appears at the beginning of the line.
- To cancel the setting, press CLEAR.

4 Press the joystick (OK).

If any timer settings remain, turn off the VCR to return to recording standby.

When the timer settings overlap

The program that starts first has priority and the second program starts recording only after the first program has finished. If the programs start at the same time, the program listed first in the menu has priority.



Recording stereo and bilingual programs

Recording stereo programs

This VCR automatically receives and records stereo programs. When a stereo program is received, the STEREO indicator lights up. If there is noise in the stereo program, set AUTO STEREO in the ADVANCED OPTIONS menu to OFF. The sound will be recorded in monaural (on both hi-fi and normal audio tracks) but with less noise. For details, see page 73.

Recording bilingual programs

Normally, this VCR records only the main sound. When a SAP (Second Audio Program) is received, the SAP indicator lights up. To record only SAP sound, set TUNER AUDIO in the ADVANCED OPTIONS menu to SAP. For details, see page 73.

Selecting the sound while playing

Press AUDIO MONITOR to select the desired sound. (The sound being recorded will not change.)

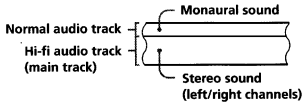
Stereo program

To listen to	Indicator on the TV screen
Stereo	STEREO
Left channel	L
Right channel	R
Monaural sound on the normal audio track*	No indicator appears

* Usually the mixed sound of left and right channels

How sound is recorded on a video tape

The VCR records sound onto two separate tracks. Hi-fi audio is recorded onto the main track along with the picture. Monaural sound is recorded onto the normal audio track along the edge of the tape.



Notes

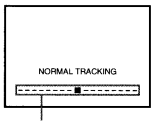
- To play a tape in stereo, you must use the A/V connections.
- When you play a tape recorded in monaural, the sound is heard in monaural regardless of the AUDIO MONITOR setting.

Adjusting the picture

Adjusting the tracking

Although the VCR automatically adjusts the tracking when playing a tape (the ▨ indicator flashes in the display window, then goes off), distortion may occur if the tape was recorded in poor condition. In this case, manually adjust the tracking.

Press the TRACKING +/– buttons on the VCR to display the tracking meter. The distortion should disappear as you press one of the two buttons (the ▨ indicator lights up). To resume automatic tracking adjustment, eject the tape and reinsert it.



Tracking meter

About Adaptive Picture Control (APC)

Adaptive Picture Control (APC) automatically improves recording and playback quality by adjusting the VCR to the condition of the video heads and tape. To maintain better picture quality, we recommend that you set APC to ON in the ADVANCED OPTIONS menu (with the APC indicator in the display window lit). For details, see page 73.

APC playback

The APC function automatically works on all types of tapes, including rental tapes and tapes that were not recorded with APC.

APC recording

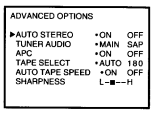
Whenever you insert a tape and first start recording, the VCR adjusts to the tape using the APC function (the APC indicator flashes rapidly). This adjustment is retained until the tape is ejected.

Notes

- The auto tracking adjustment cannot be guaranteed to work with on tapes recorded in the LP mode on other VCRs.
- When you set AUTO TAPE SPEED to ON in the ADVANCED OPTIONS menu, the APC function doesn't work if the tape speed is automatically changed from the SP to EP mode during a timer recording, unless the tape has been recorded in the EP mode with the APC function. For details, see page 73.
- There is a delay of a few seconds before the VCR actually starts recording while the VCR analyzes the tape. To avoid the delay, first set the VCR to recording pause (the APC indicator flashes slowly) and press ● REC to have the VCR analyze the tape. After the APC indicator stops flashing, push the joystick to ❚❚ PAUSE to start recording immediately. If you push the joystick to ❚❚ PAUSE before the APC indicator stops flashing, the APC function is canceled.

Changing menu options

1 Press MENU and select ADVANCED OPTIONS.



2 Push the joystick to ↑/↓ to select the option to change, then push the joystick to ←/→ to change the setting.

3 Press the joystick (OK) to return to the original screen.

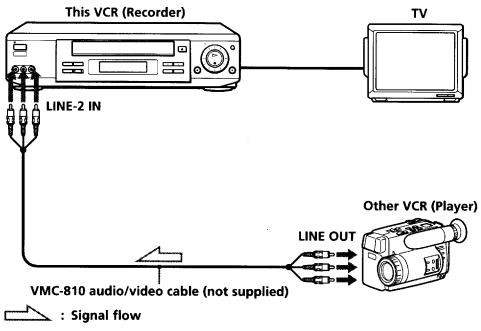
Menu choices

Initial settings are indicated in bold print.

Menu option	Set this option to
AUTO STEREO	**ON** to receive stereo programs. OFF to reduce noise; the sound changes to monaural.
TUNER AUDIO	**MAIN** to record the main sound on both hi-fi and normal audio tracks. SAP to record the SAP (Second Audio Program) sound on both hi-fi and normal audio tracks.
APC	**ON** to switch on the APC (Adaptive Picture Control) function and improve picture quality. OFF to switch off APC.
TAPE SELECT	**AUTO** or 180 (when using a T-140 or T-180) to select the tape length and display the remaining time correctly.
AUTO TAPE SPEED	**ON** to change the timer recording tape speed automatically to the EP mode when the remaining tape becomes shorter than the recording time. OFF to keep the set tape speed.
SHARPNESS	L (Low) through H (High) to adjust the sharpness of the picture. L to turn off the sharpness control.

Editing with another VCR

How to hook up to record on this VCR



How to hook up to a stereo system

Connect LINE-2 IN AUDIO on this VCR to the audio output jacks on the stereo system, using the RK-C510KS audio cable (not supplied).

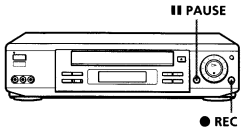
If the other VCR has a CONTROL S OUT jack for synchronized editing

Hook up to record on the other VCR, then connect the VCRs via the CONTROL S jacks. The CONTROL S connection lets you control (pause and release pause) both VCRs from the recording VCR.

Notes

- Make sure you connect the plugs to jacks of the same color.
- If the other VCR is a monaural type and connected to this VCR's LINE-2 IN jacks, connect the audio plug to the AUDIO L (white) jack. The sound is recorded on both right and left channels. When connecting to the AUDIO R (red) jack, the sound is recorded only on the right channel.
- If you connected this VCR to both the LINE IN and LINE OUT jacks of the other VCR, select the input correctly to prevent a humming noise.
- You can also use the LINE-1 IN jacks instead. If the other VCR is a monaural type, the sound is recorded only on the channel whose jack is connected to the audio plug. To record on both right and left channels, connect the audio plugs to the AUDIO R/L jacks using a VMC-910MS audio/video cable (not supplied).

Operation (when recording on this VCR)



Before you start editing

- Turn on your TV and set it to the video channel.
- Press INPUT SELECT to display "L1" or "L2" in the display window.
- Press SP/EP to select the tape speed, SP or EP.

1 Insert a source tape with its safety tab removed into the other (playback) VCR. Search for the point to start playback and set it to playback pause.

2 Insert a tape with its safety tab in place into this (recording) VCR. Search for the point to start recording and press ❚❚ PAUSE.

3 Press ● REC on this VCR and set it to recording pause.

4 To start editing, press the ❚❚ PAUSE buttons on both VCRs at the same time.

To stop editing

Press the ■ STOP buttons on both VCRs.

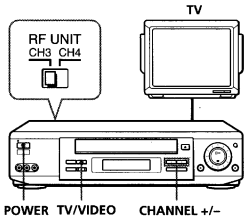
Note

- If you start recording following the procedure above, the VCR won't start recording with the APC function. To record a tape with the APC function, press ● REC again during recording pause in step 3 so that the VCR analyzes the tape. Then when you start recording in step 4, press ❚❚ PAUSE immediately after the APC indicator stops flashing. If you press ❚❚ PAUSE before the APC indicator stops flashing, the APC function is canceled.

General setup information

Setting the RF unit

When connecting the VCR to the TV using only the antenna cable, you must set the RF UNIT switch on the rear of the VCR so that the TV can receive the correct signal from the VCR.



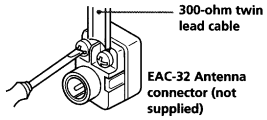
1. Set the RF UNIT switch on the rear of the VCR to CH 3 or CH 4, whichever channel is not used in your area. If both are used, set the switch to either channel.
2. Press POWER to turn on the VCR.
3. Press TV/VIDEO to turn on the VIDEO indicator in the VCR's display window.
4. Press CHANNEL +/– to display a channel number in the display window. Select an active channel number in your area.
5. Turn on your TV and set it to the channel you selected in step 1 (channel 3 or 4).

   The selected TV channel broadcast appears on the TV screen. If the channels change when you press CHANNEL +/–, you have made the correct setting.

   Whenever you use the VCR, set the TV to the channel selected in step 1.

Attaching the external antenna connector

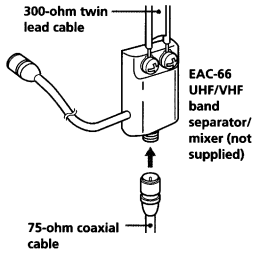
When using a 300-ohm twin lead cable for VHF/UHF antenna, use the EAC-32 antenna connector (not supplied) to connect the antenna to the VCR.



1. Loosen the screws on the antenna connector.
2. Wind the twin leads around the screws on the antenna connector.
3. Retighten the screws.

Attaching a UHF/VHF band mixer

When using both 75-ohm coaxial cable and 300-ohm twin lead cable for VHF/UHF antenna, use the EAC-66 UHF/VHF band separator/mixer (not supplied) to connect the antenna to the VCR.

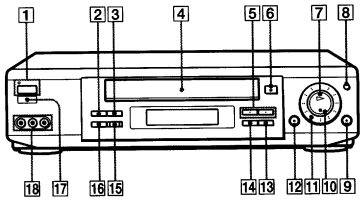


1. Loosen the screws on the mixer.
2. Wind the twin leads around the screws on the mixer.
3. Retighten the screws.
4. Connect the 75-ohm coaxial cable to the mixer.

Index to parts and controls

Refer to the pages indicated in parentheses ( ) for details.

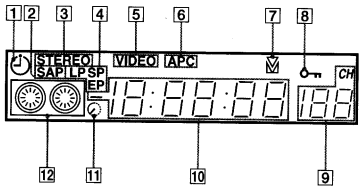
Front panel



1 POWER switch/indicator (57)
2 SP (Standard Play)/EP (Extra Play) button (53, 57)
3 TV/VIDEO button (54)
4 Tape compartment
5 CHANNEL/TRACKING +/– buttons (53, 72)
6 ⏏ EJECT button (51)
7 ▷ PLAY button (51, 61)
8 JOG button (62)
9 ● REC (record) button (53, 75)
10 ■ STOP button (51)
11 Shuttle ring (54, 62)
12 ❚❚ PAUSE button (51)
13 ▶▶ FF (fast-forward) button (51, 61)
14 ◀◀ REW (rewind) button (51, 61)
15 EASY SET UP button (11, 14, 17, 20, 23, 26)
16 INPUT SELECT button (53, 55)
17 Remote sensor (5)
18 LINE-2 IN VIDEO/AUDIO L/R jacks (74)

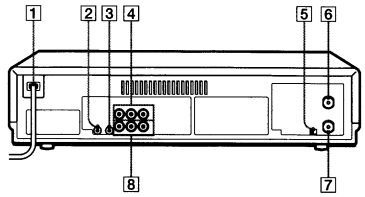
continued

Display window



1 Timer indicator (57)
2 SAP indicator (70)
3 STEREO indicator (70)
4 Tape speed indicator (53)
5 VIDEO indicator (54, 76)
6 APC indicator (72)
7 Tracking indicator (72)
8 Child Lock indicator (58)
9 Line/channel indicator (53, 75)
10 Time counter/clock indicator (51)
11 Remaining time indicator (54)
12 Tape/recording indicator (53)

Rear panel



1 AC power cord (7)

2 S LINK (CONTROL S IN) jack (9)

3 CABLE BOX CONTROL (CONTROL S OUT) jack (10, 22)

4 LINE-1 IN AUDIO L/R/VIDEO jacks (22, 74)

5 RF (Radio Frequency) UNIT switch (76)

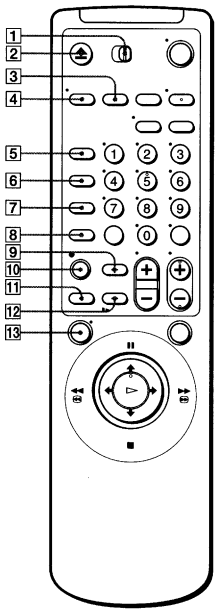
6 VHF/UHF IN connector (10, 13, 16, 19, 22, 25)

7 VHF/UHF OUT connector (10, 13, 16, 19, 22, 25)

8 LINE OUT AUDIO L/R/VIDEO jacks (8)

continued

Remote commander



1 TV/RECEIVER/VIDEO remote control switch (5)

2 ⏏ EJECT button (51)

3 COUNTER RESET button (51)

4 DISPLAY button (54, 64)

5 CLEAR button (68)

6 QUICK TIMER button (67)

7 INPUT SELECT button (53, 60, 75)

8 SP (Standard Play)/EP (Extra Play) button (53)

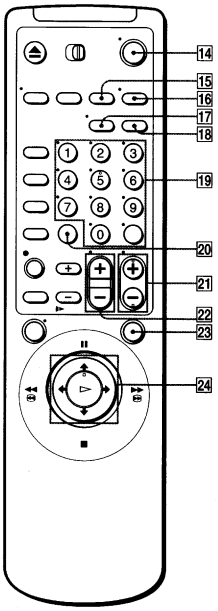
9 ×2/RECEIVER VOL (volume) + button (5, 61)

10 ● REC (record) button (53)

11 MUTING button (5)

12 ▮► SLOW/RECEIVER VOL (volume) – button (5, 61)

13 MENU button (30, 73)



14 POWER switch (57)

15 COUNTER/REMAIN button (54)

16 AUDIO MONITOR button (70)

17 TV/VIDEO button (76)

18 VCR Plus+ button (56)

19 Number buttons and ENTER button (48, 57)

20 SET button (57)

21 CH (channel) +/– buttons (53)

22 VOL (volume) +/– buttons

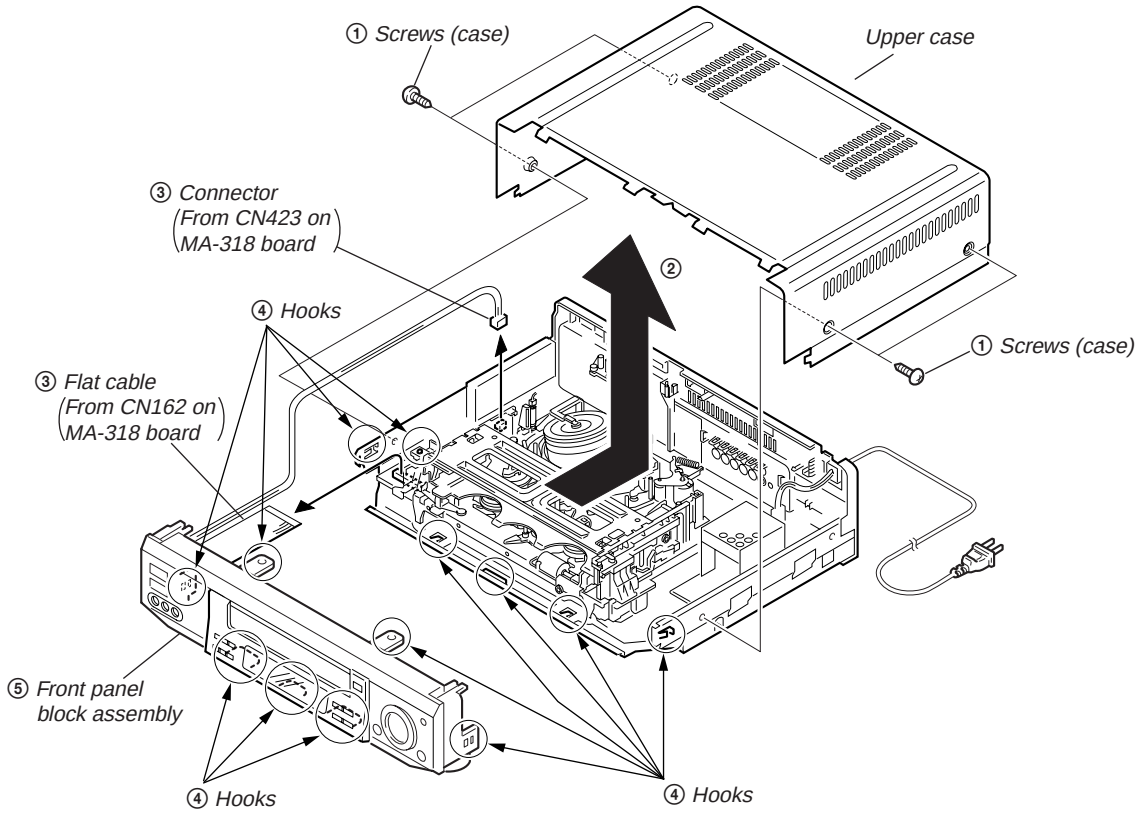
23 SMART CUE button (51)

24 Joystick
▷ PLAY/OK (51, 61)
▮▮ PAUSE/↑ (51)
■ STOP/↓ (51)
◀◀ REW (rewind)/← (51, 61)
▶▶ FF (fast-forward)/→ (51, 61)

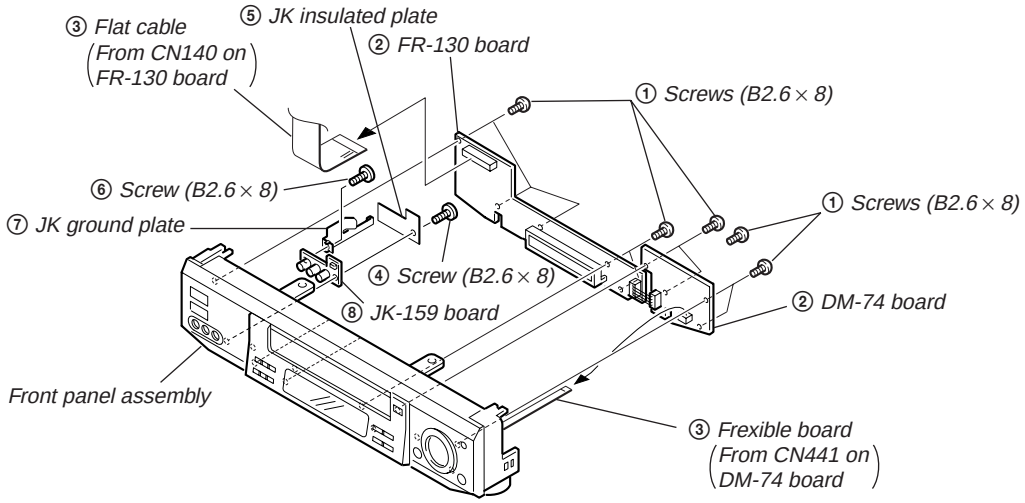
SECTION 2
DISASSEMBLY

NOTE: Follow the disassembly procedure in the numerical order given.

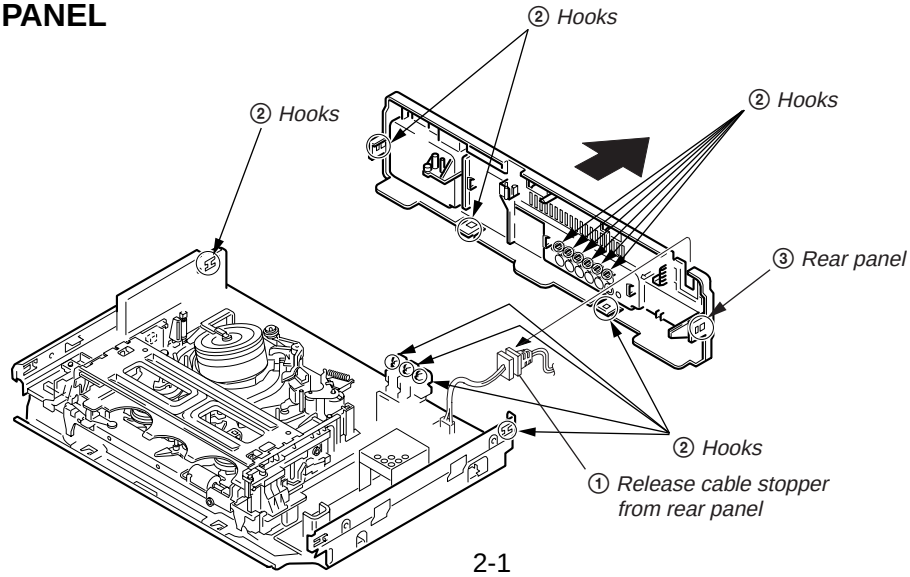
2-1. UPPER CASE, FRONT PANEL BLOCK ASSEMBLY



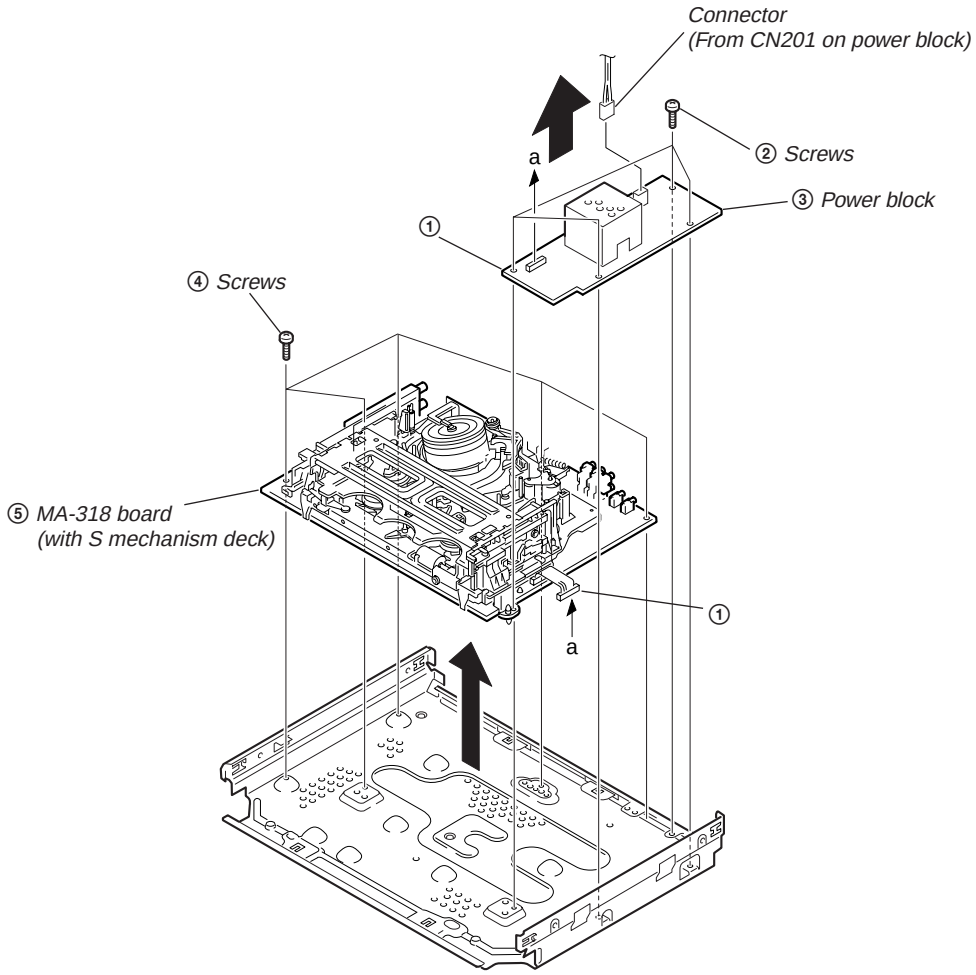
2-2. FR-130 BOARD, DM-74 BOARD



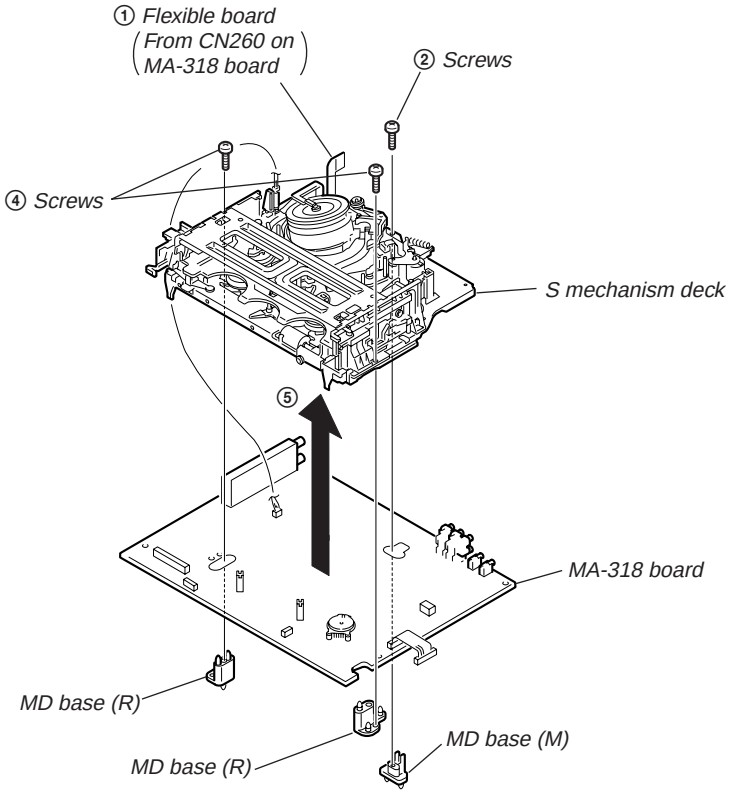
2-3. REAR PANEL



2-4. POWER BLOCK, MA-318 BOARD (WITH S MECHANISM DECK)



2-5. S MECHANISM DECK



2-6. INTERNAL VIEWS

— Top View —

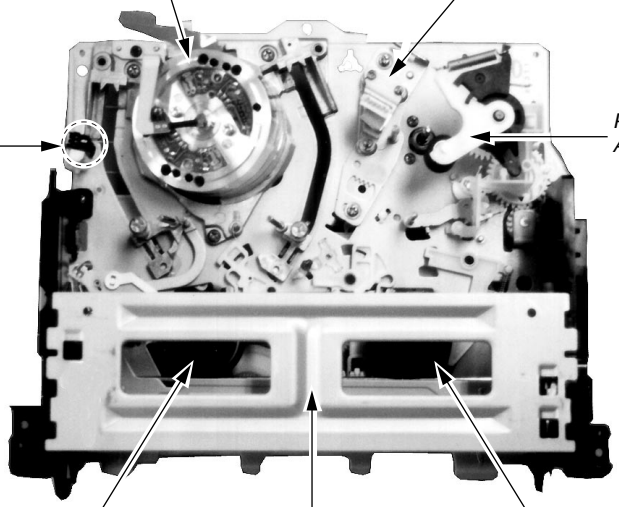
M901 (Note)
Upper drum assembly DZR-45-R
8-848-576-02 (Except 998HF)
Upper drum assenbly DZR-51-R
8-848-594-02 (998HF)
Lower drum assembly DZL-51B/J-RP
8-848-666-11
Drum Assembly DZH-94A/Z-RP (Except 998HF)
8-839-044-02
Drum Assembly DZH-96A-R (998HF)
8-839-046-02

Note : See page 7 for the note about drum assembly.

ACE head block assembly
A-6759-620-A

FE head
1-500-144-11

Pinch press block assembly
A-6759-615-A



FL complete assembly
A-6759-619-C

Reel (S) table
3-977-507-01

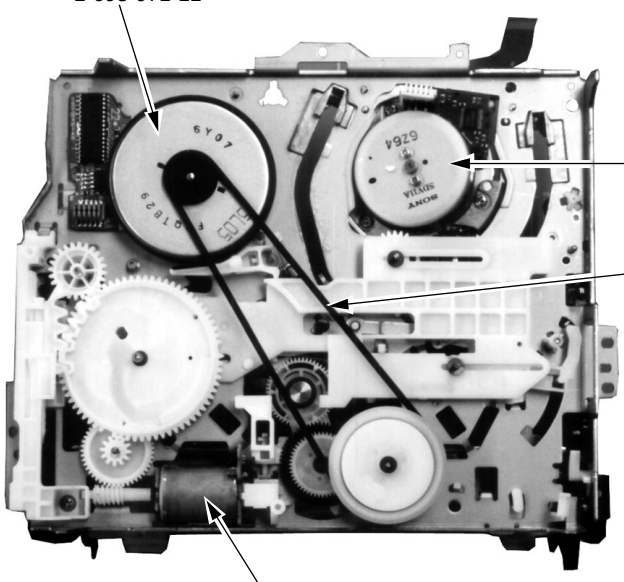
Reel (T) table
3-977-508-01

— Bottom View —

M902
DC motor (capstan)
1-698-971-11

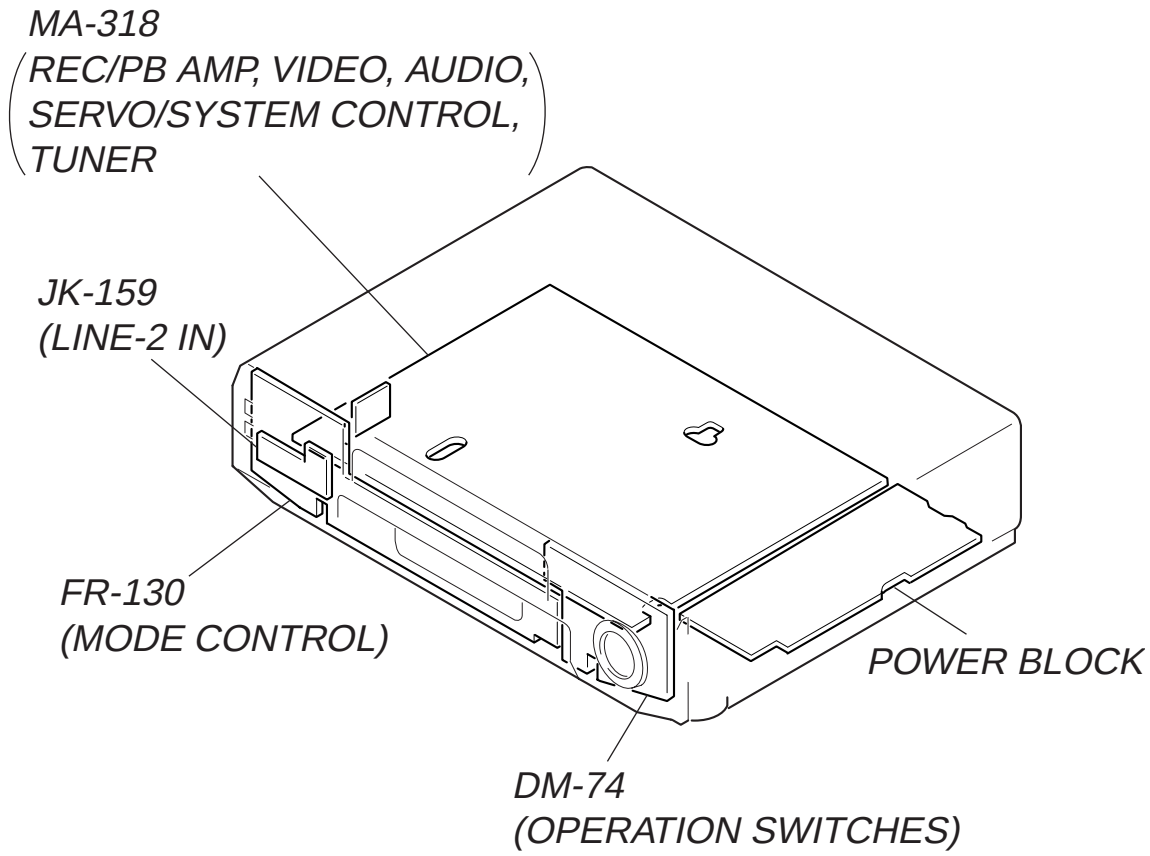
M901 (Note)
Lower drum assembly
DZL-51B/J-RP
8-848-666-11

Rubber belt
3-977-510-01



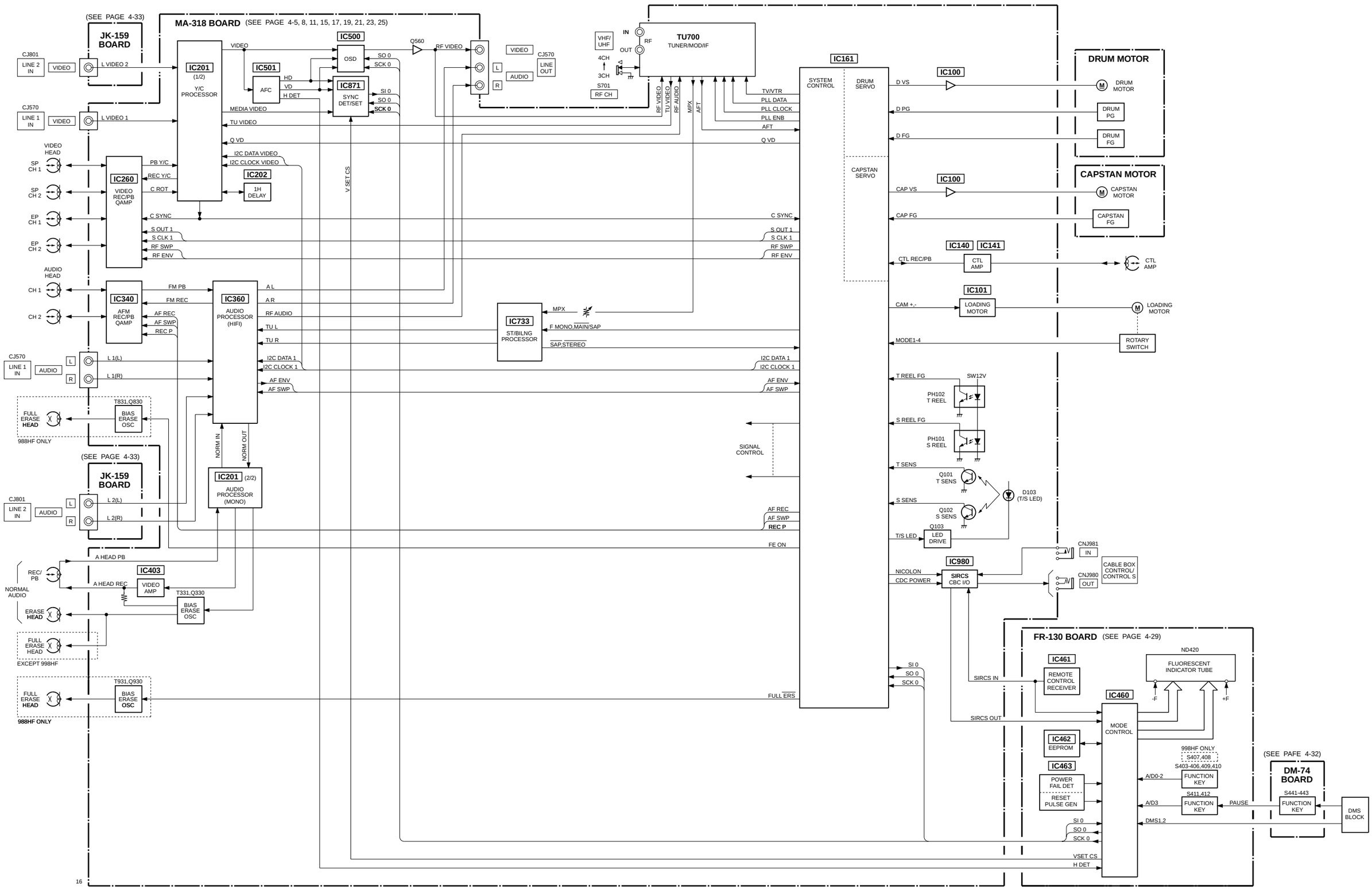
M903
Cam motor assembly
X-3947-577-1

2-7. INTERNAL VIEWS

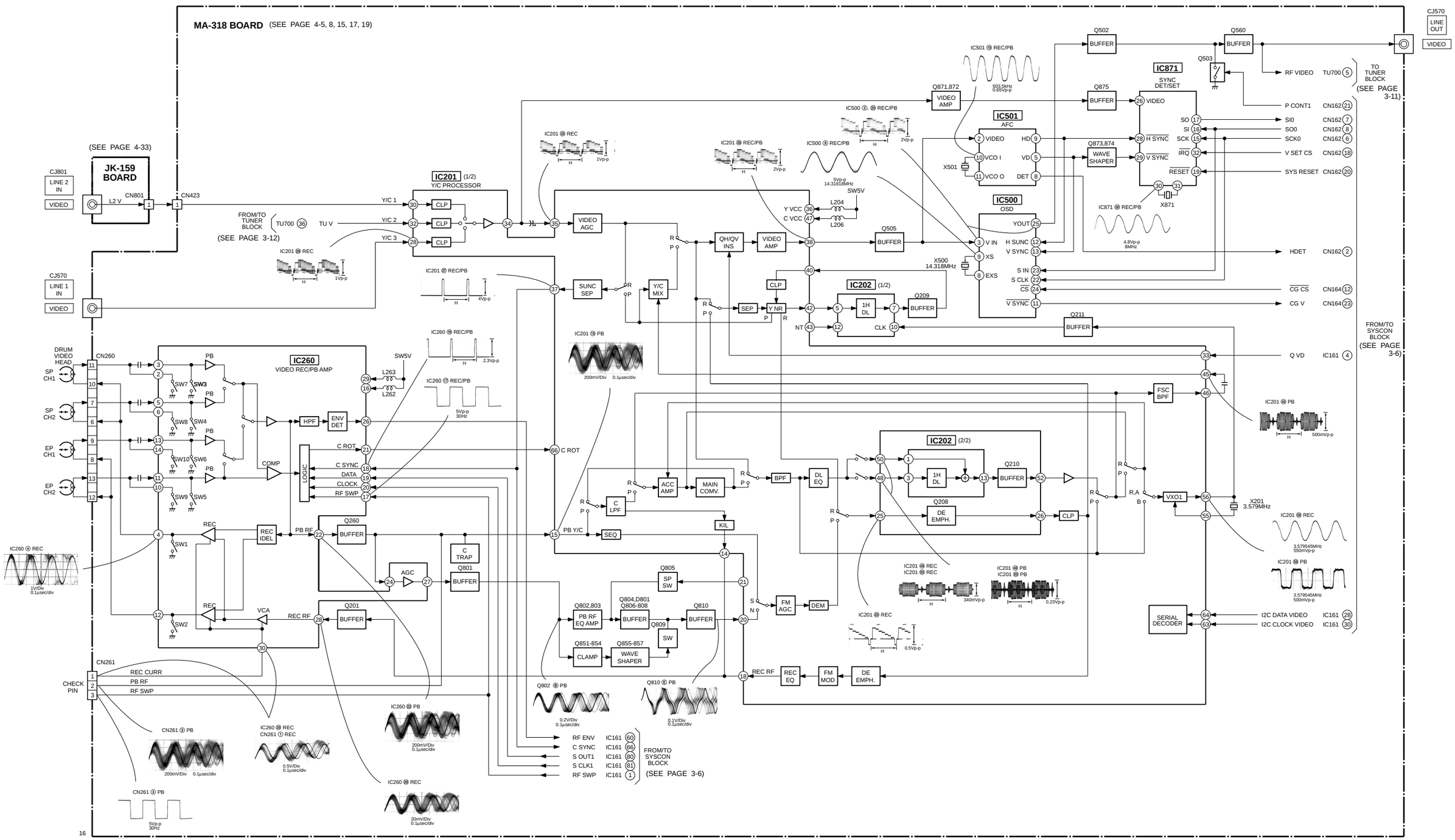


SECTION 3
BLOCK DIAGRAMS

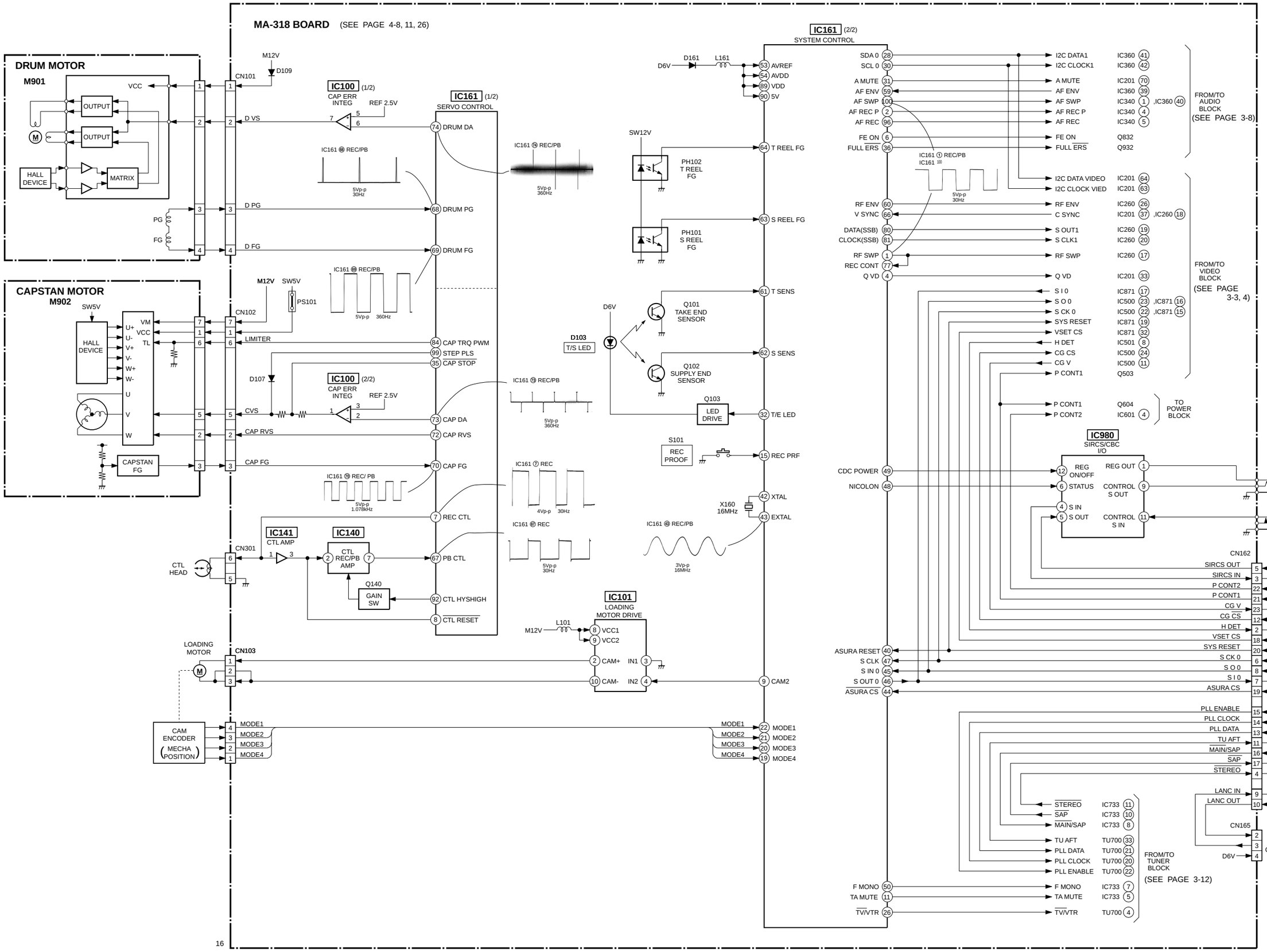
3-1. OVERALL BLOCK DIAGRAM



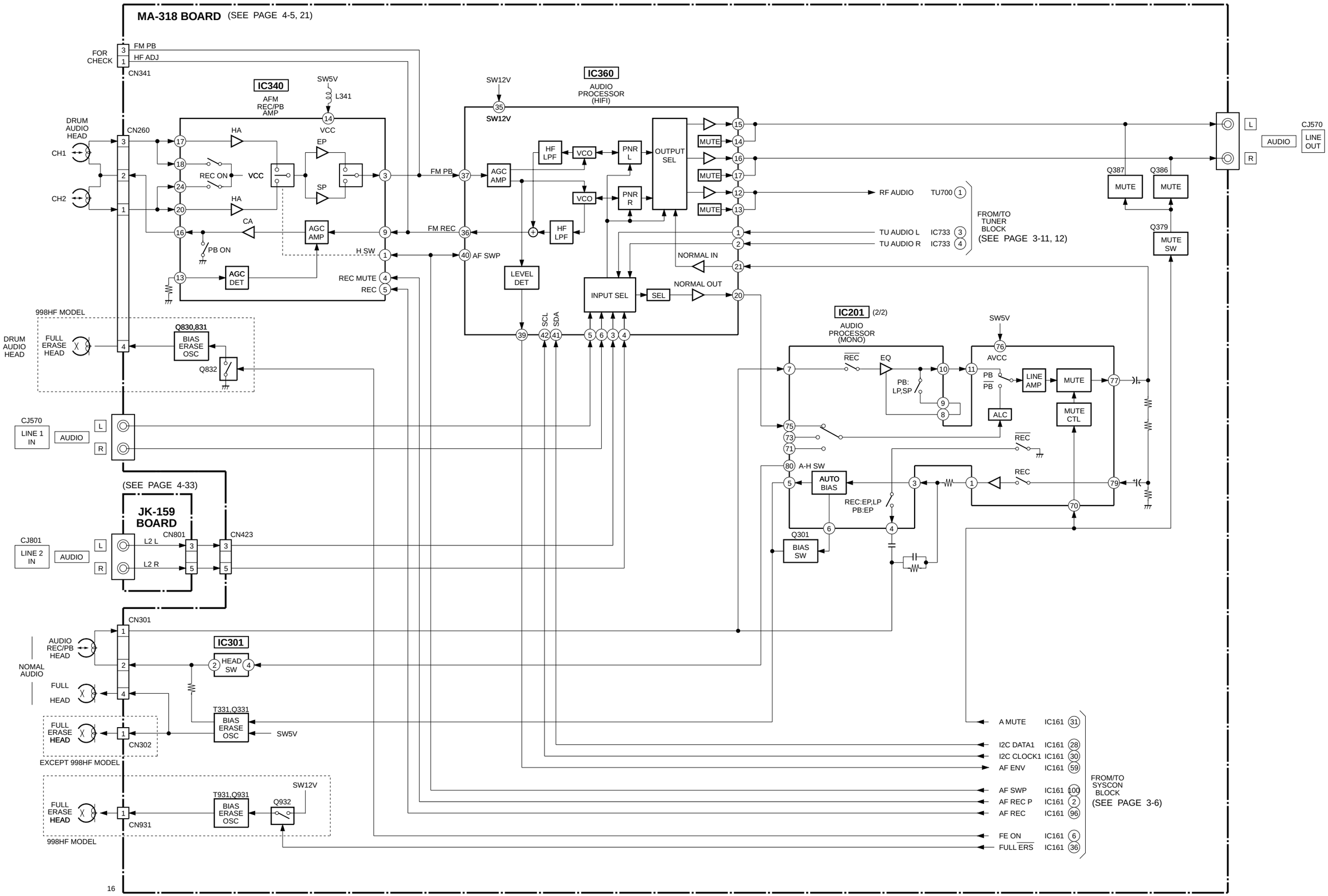
3-2. VIDEO BLOCK DIAGRAM



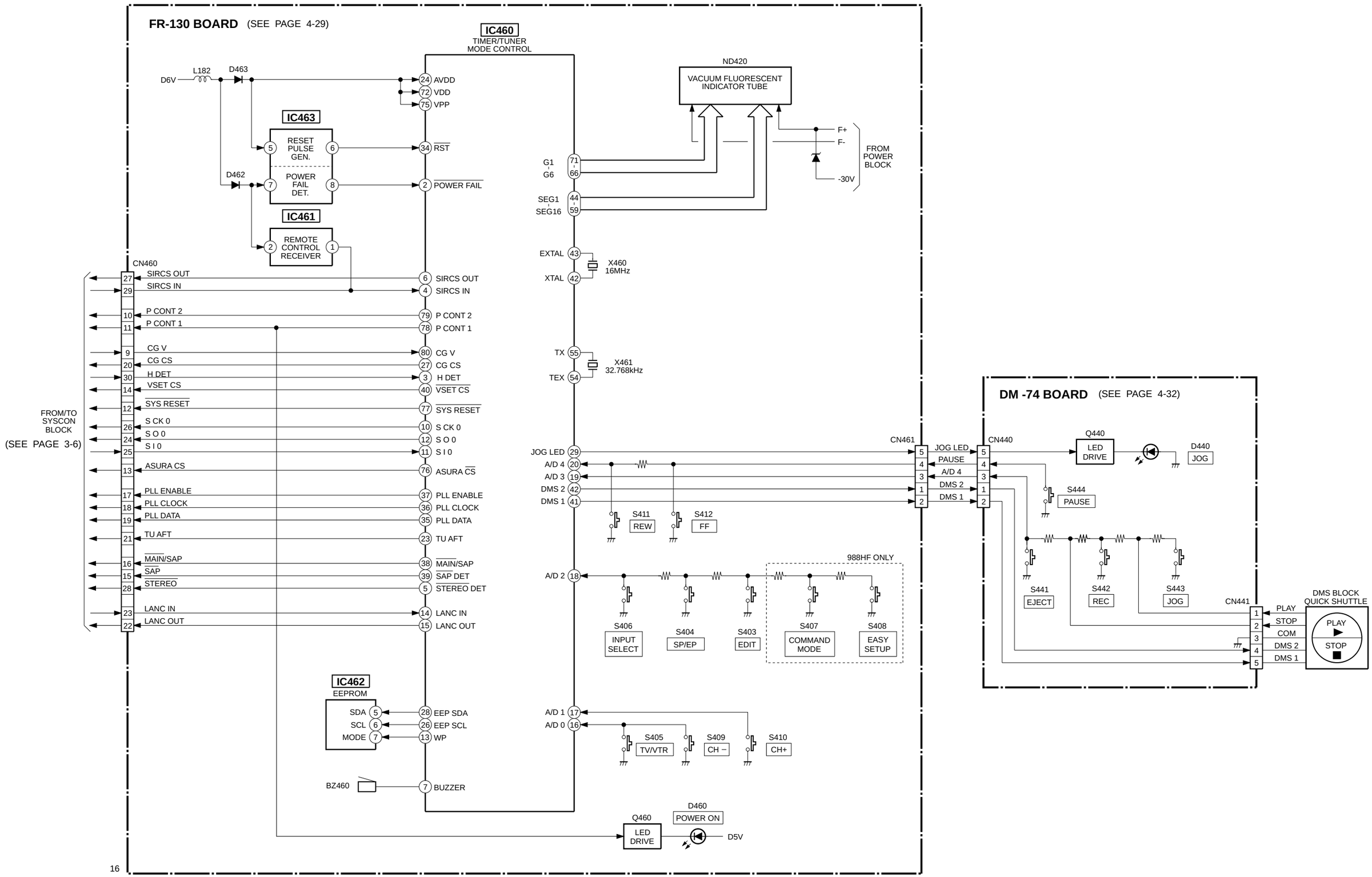
3-3. SERVO/SYSTEM CONTROL BLOCK DIAGRAM



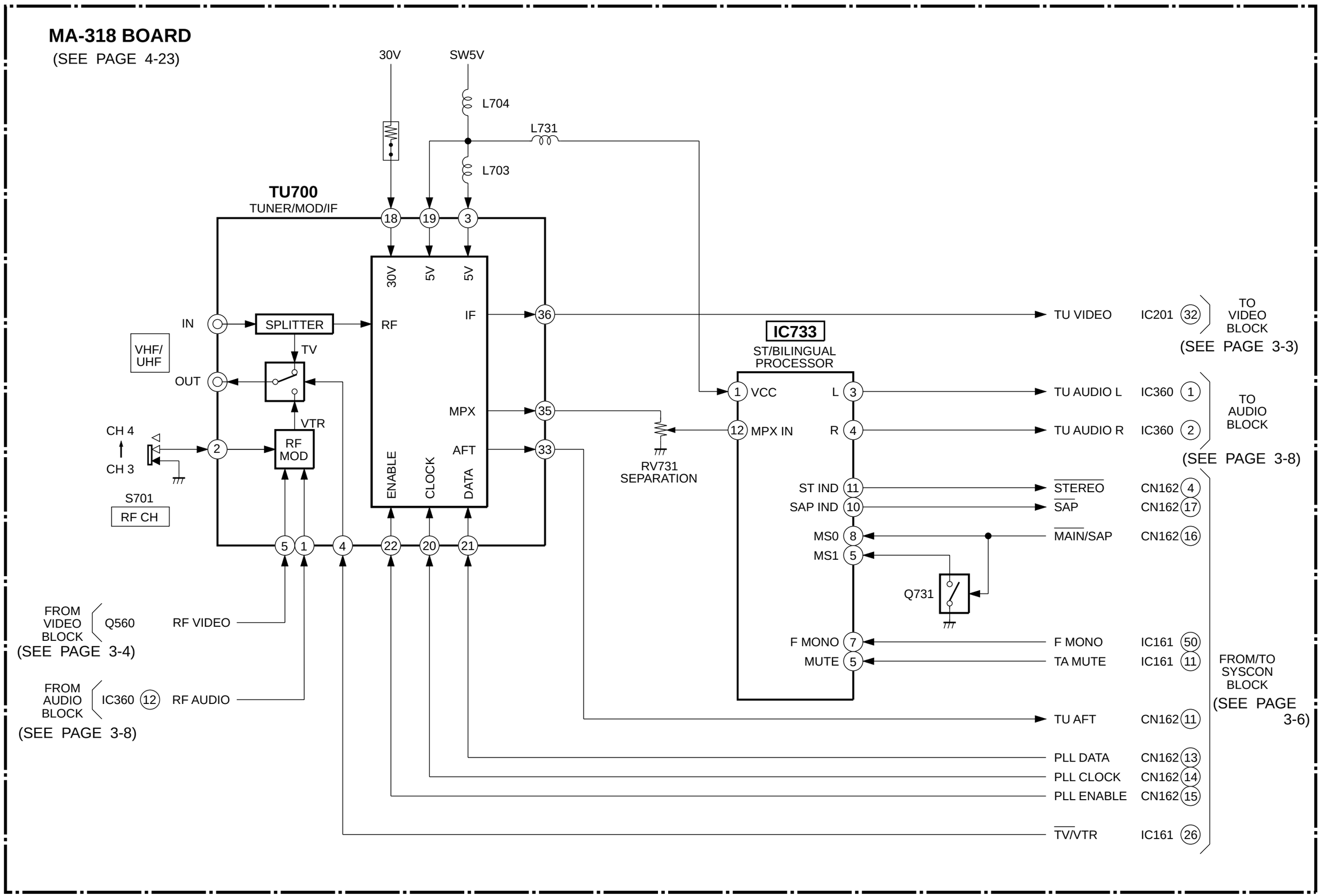
3-4. AUDIO BLOCK DIAGRAM



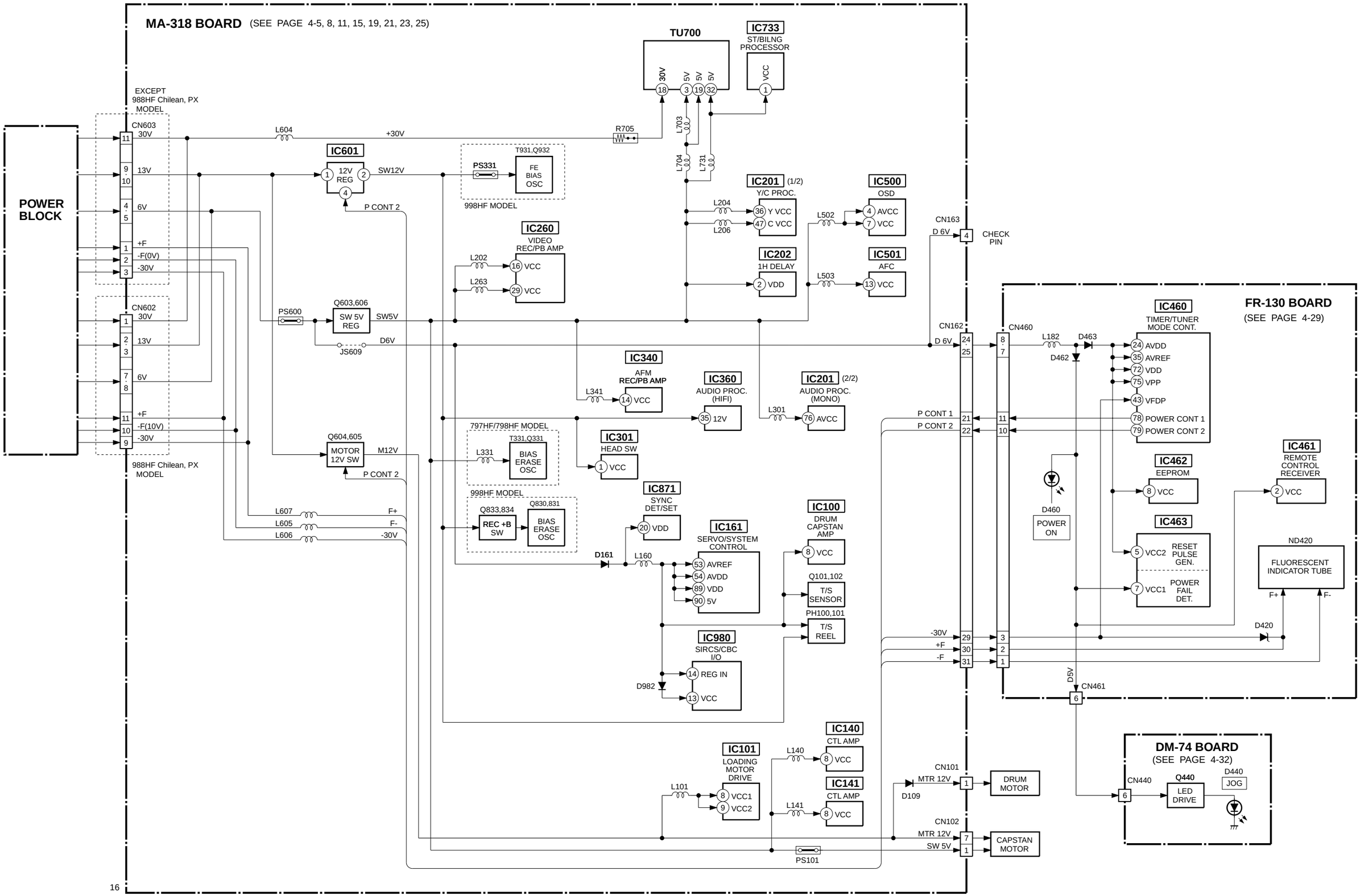
3-5. MODE CONTROL BLOCK DIAGRAM



3-6. TUNER BLOCK DIAGRAM



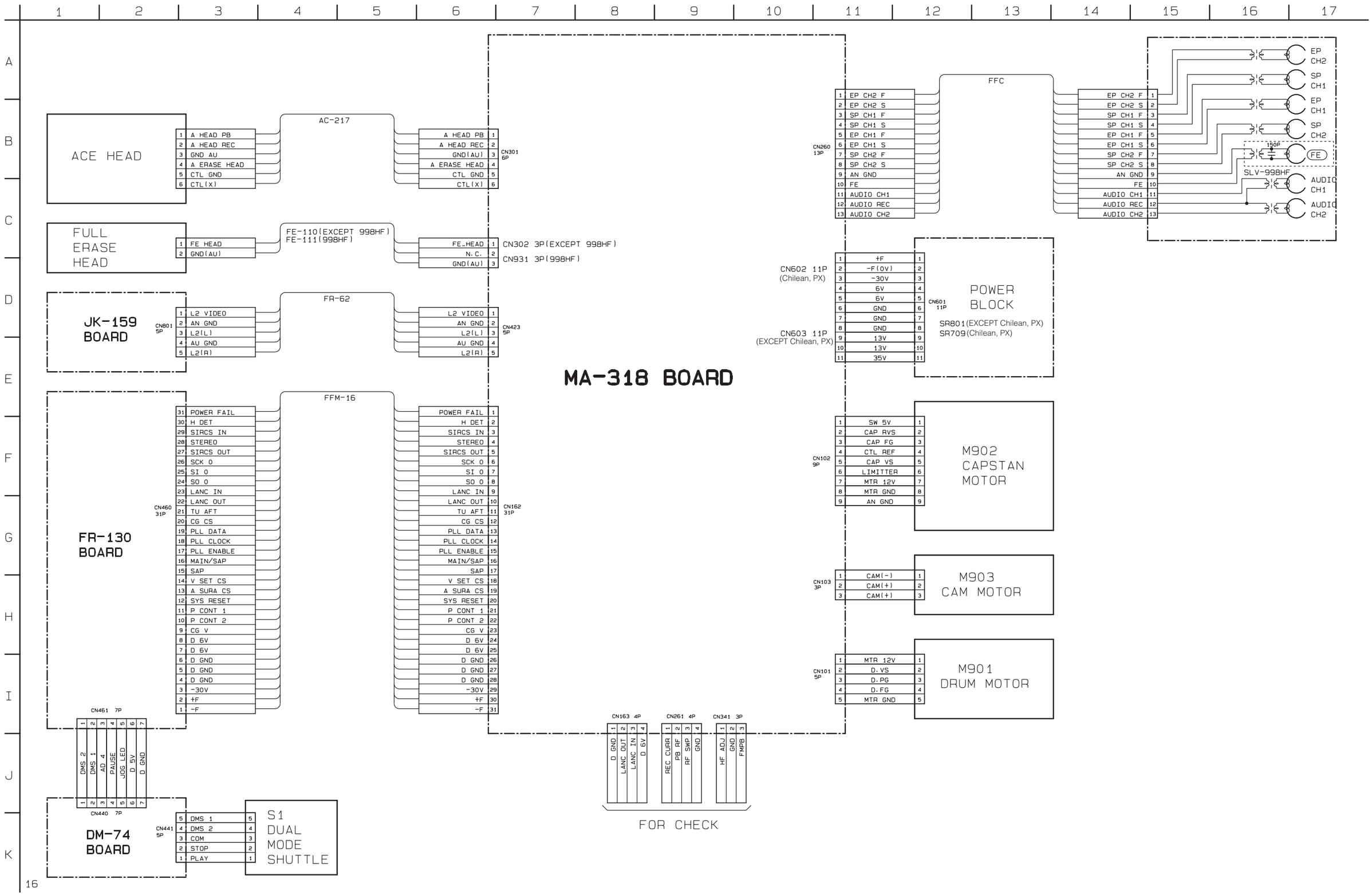
3-7. POWER SUPPLY BLOCK DIAGRAM



16

SECTION 4
PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS

4-1. FRAME SCHEMATIC DIAGRAM



4-2. PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS

MA-318 (REC/PB AMP, VIDEO, SERVO/SYSTEM CONTROL, AUDIO, TUNER) PRINTED WIRING BOARD

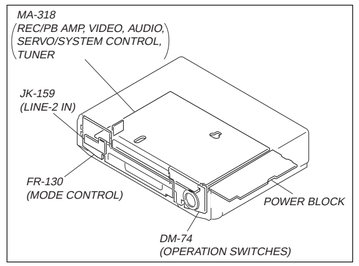
— Ref. No.: MA-318 Board; 1,000 Series —

There are few cases that the part printed on this diagram isn't mounted in this model.

MA-318 (REC/PB AMP) SCHEMATIC DIAGRAM
— Ref. No.: MA-318 Board; 1,000 Series —

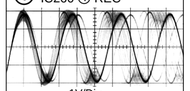
MA-318 BOARD

CJ570	A-3	D983	A-1	Q502	B-2
		D984	A-1	Q503	B-2
CN101	C-7			Q505	D-1
CN102	E-2	IC100	G-6	Q560	B-3
CN103	I-4	IC101	I-3	Q603	J-2
CN162	J-12	IC140	H-11	Q604	J-3
CN163	I-12	IC141	A-5	Q605	J-4
CN260	B-9	IC161	I-9	Q606	J-2
CN261	B-7	IC201	D-5	Q731	H-13
CN301	B-4	IC202	E-5	Q801	B-8
CN302	B-5	IC260	B-8	Q802	E-10
CN341	B-10	IC301	B-5	Q803	D-9
CN423	C-12	IC340	B-10	Q804	E-9
CN602	F-1	IC360	B-11	Q805	E-9
CN603	H-1	IC500	C-1	Q806	E-8
CN931	D-10	IC501	D-1	Q807	E-8
		IC601	E-12	Q808	E-8
CNJ980	A-2	IC733	H-13	Q809	D-8
CNJ981	A-1	IC871	I-6	Q810	E-8
		IC980	B-1	Q830	C-9
D103	F-6			Q831	C-9
D107	G-8	PH101	H-8	Q832	D-10
D109	F-4	PH102	H-4	Q833	C-10
D161	J-8			Q834	C-9
D370	C-10	Q101	F-1	Q851	C-8
D379	A-11	Q102	F-10	Q852	C-8
D502	C-1	Q103	F-5	Q853	D-8
D503	C-2	Q140	H-10	Q854	D-8
D504	C-2	Q201	C-3	Q855	D-8
D560	B-3	Q205	C-3	Q856	D-8
D561	A-10	Q208	D-4	Q857	D-8
D611	J-3	Q209	E-4	Q871	I-5
D612	J-3	Q210	E-5	Q872	I-5
D614	J-3	Q211	D-6	Q873	I-5
D702	F-12	Q260	B-7	Q874	I-5
D801	D-9	Q301	C-5	Q875	H-5
D802	D-9	Q331	C-6	Q931	D-11
D980	A-2	Q379	A-11	Q932	D-10
D981	A-2	Q386	A-11		
D982	B-1	Q387	A-11		

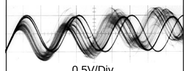


MA-318 BOARD

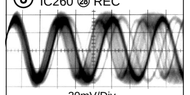
① IC260 ④ REC



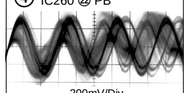
② IC260 ㉚ REC
CN261 ① REC



③ IC260 ㉘ REC

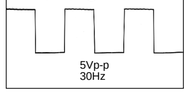


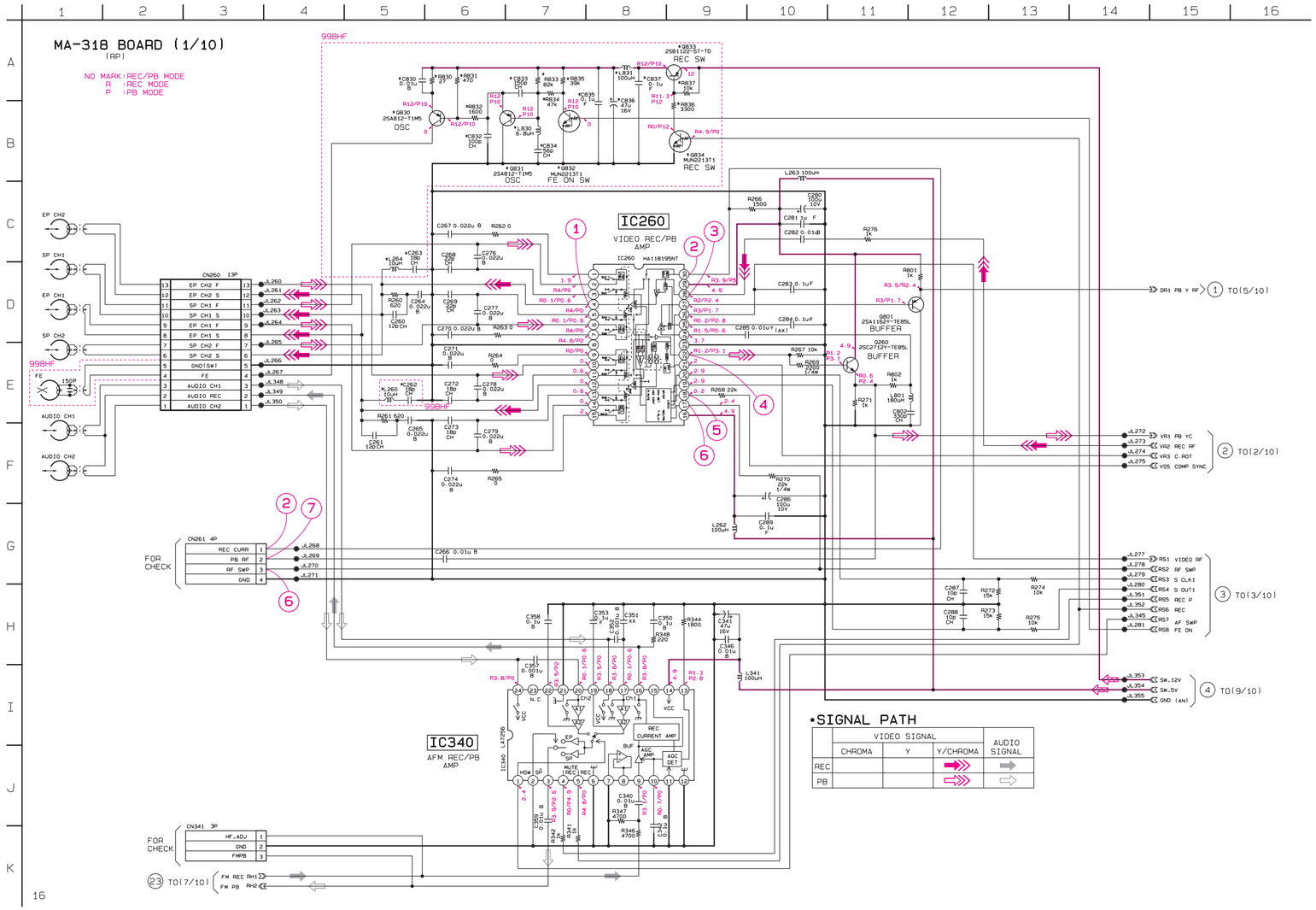
④ IC260 ㉒ PB



⑤ IC260 ⑱ REC/PB

⑥ IC260 ⑰ REC/PB
CN261 ③ REC/PB





THIS NOTE IS COMMON FOR PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS. (In addition to this, the necessary note is printed in each block.)

- **For printed wiring boards.**
- ▒▒▒ : Pattern from the side which enables seeing.

Caution :
Pattern face side: (Conductor Side) — Parts on the pattern face side seen from the pattern face are indicated.
Pattern face side: (Component Side) — parts on the parts face side seen from the parts face are indicated.

- **For schematic diagrams.**
- Caution when replacing chip parts. New parts must be attached after removal of chip. Be careful not to heat the minus side of tantalum capacitor, because it is damaged by the heat.
- All resistor are in ohms, 1/4W unless otherwise noted. Chip resistor are 1/10W unless otherwise noted. kΩ: 1000Ω, MΩ, : 1000kΩ.
- All capacitors are in µF unless otherwise noted. pF : µµF. 50V or less are not indicated except for electrolytics and tantalums.
- ▭ : panel designation.
- △ : internal component.
- ▬▬ : B+ Line. *
- ▬ ▬ : B– Line. *
- ⇨ : IN/OUT direction of (+,–) B LINE. *
- Circled numbers refer to waveforms. *
- Readings are taken with a color-bar signal input.
- Voltage are dc between ground and measurement points.*
- Readings are taken with a digital multimeter (DC10MΩ).*
- Voltage variations may be noted due to normal production tolerances.*

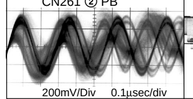
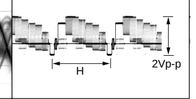
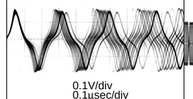
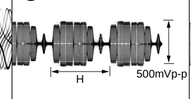
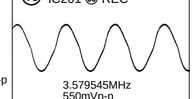
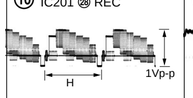
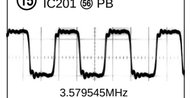
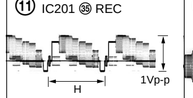
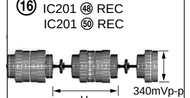
When indicating parts by reference number, please include the board name.

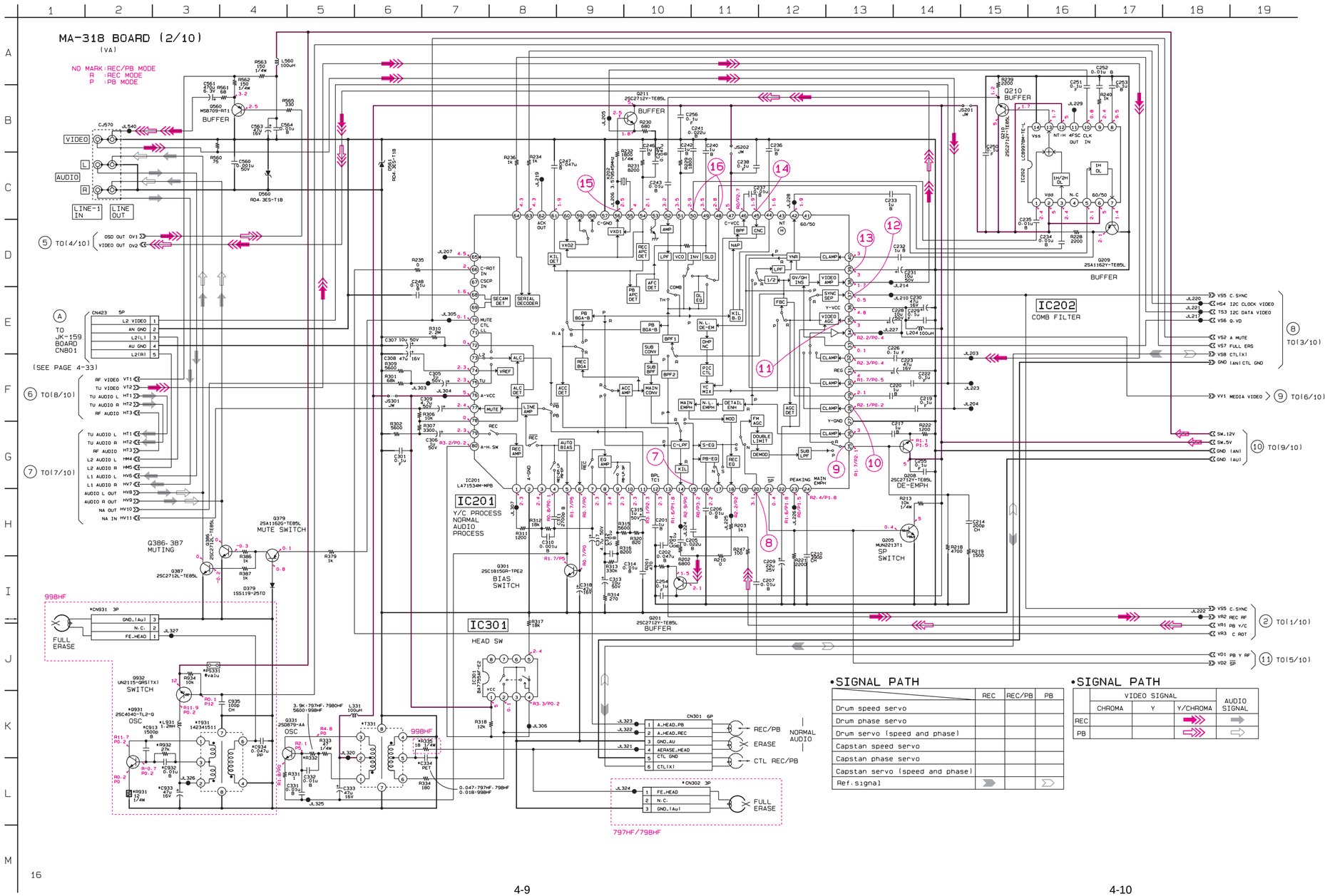
- * : indicated by the color red.

MA-318 (VIDEO, NORMAL AUDIO) SCHEMATIC DIAGRAM
— Ref. No.: MA-318 Board; 1,000 Series —

• See page 4-3 for MA-318 BOARD printed wiring board.

MA-318 BOARD

⑦ IC201 ⑮ PB CN261 ② PB  200mV/Div 0.1μsec/div	⑬ IC201 ㊳ REC/ PB  H 2Vp-p
⑧ IC201 ⑳ PB  0.1V/div 0.1μsec/div	⑭ IC201 ㊺ PB  H 500mVp-p
⑨ IC201 ㉕ REC H 0.5Vp-p	⑮ IC201 ㊻ REC  3.579545MHz 550mVp-p
⑩ IC201 ㉘ REC  H 1Vp-p	⑮ IC201 ㊻ PB  3.579545MHz 500mVp-p
⑪ IC201 ㉝ REC  H 1Vp-p	⑯ IC201 ㊽ REC IC201 ㊿ REC  H 340mVp-p
⑫ IC201 ㊲ REC/PB H 4Vp-p	⑯ IC201 ㊽ PB IC201 ㊿ PB H 0.23Vp-p



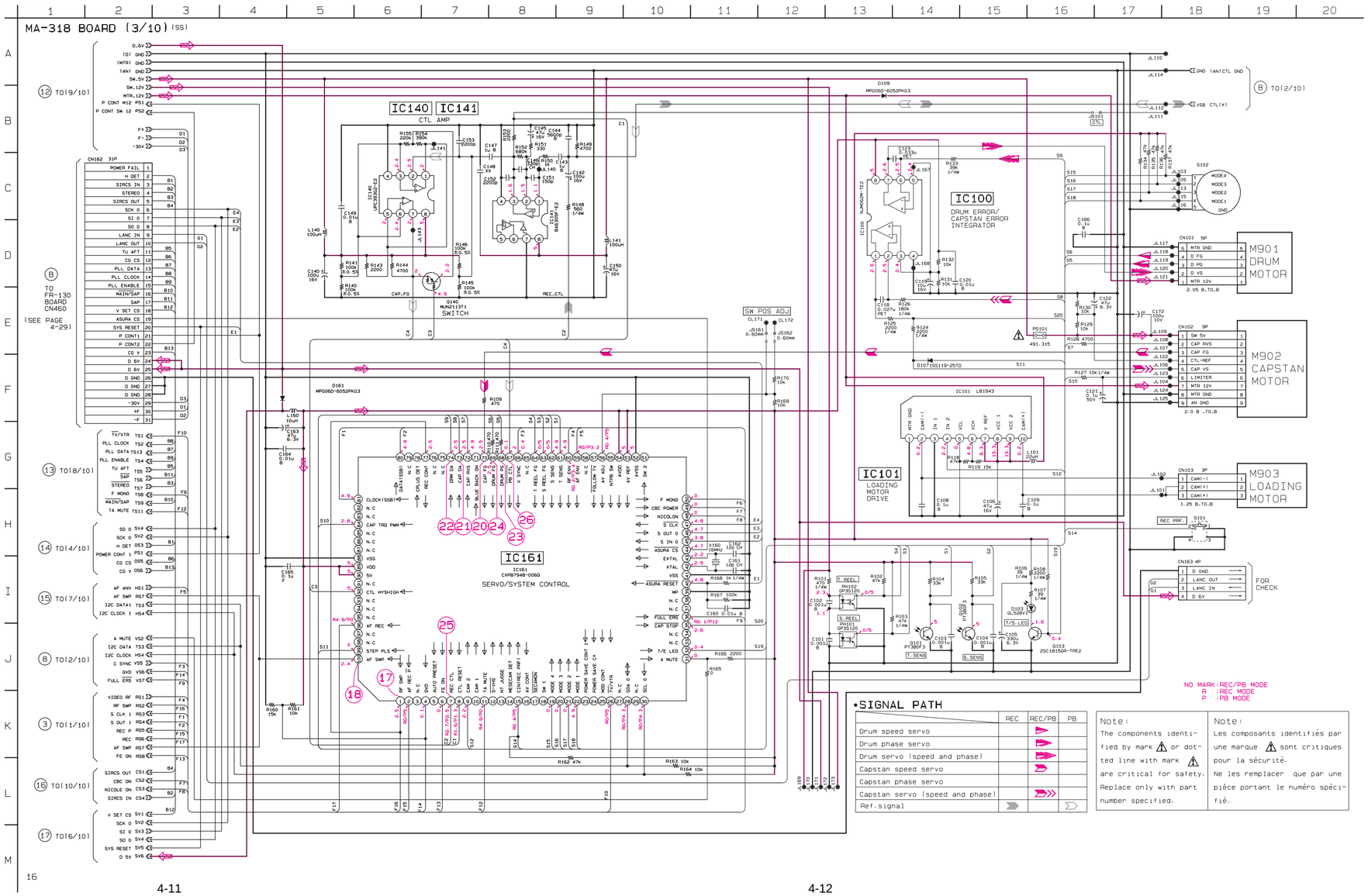
•SIGNAL PATH

	REC	REC/PB	PB
Drum speed servo			
Drum phase servo			
Drum servo (speed and phase)			
Capstan speed servo			
Capstan phase servo			
Capstan servo (speed and phase)			
Ref.signal	▶		▷

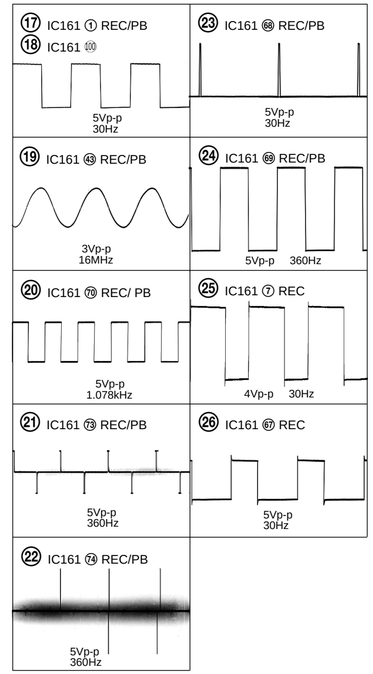
•SIGNAL PATH

	VIDEO SIGNAL			AUDIO SIGNAL
	CHROMA	Y	Y/CHROMA	
REC			▶	▶
PB			▷	▷

MA-318 (SERVO/SYSTEM CONTROL) SCHEMATIC DIAGRAM • See page 4-3 for MA-318 BOARD printed wiring board.
— Ref. No.: MA-318 Board; 1,000 Series —

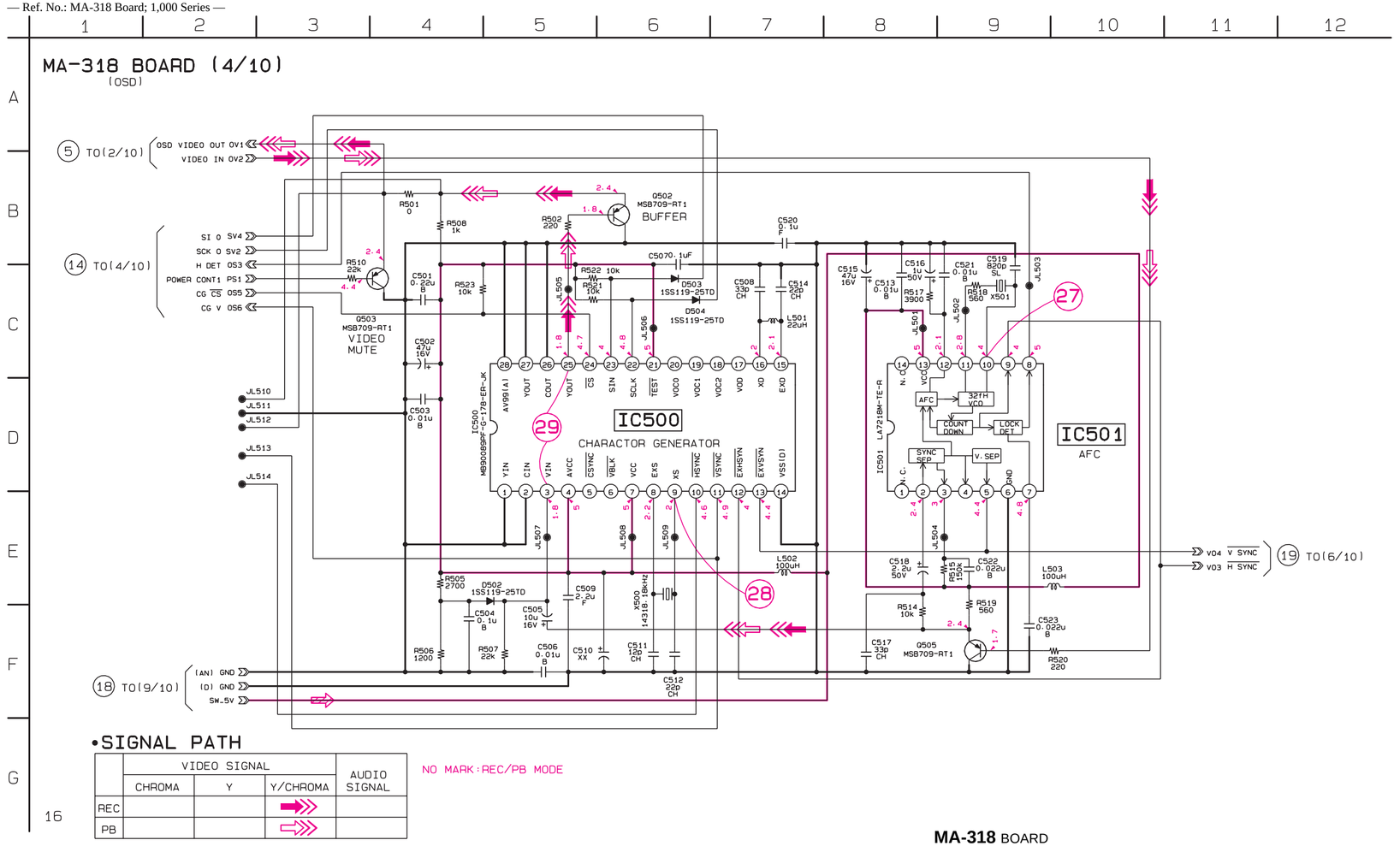


MA-318 BOARD



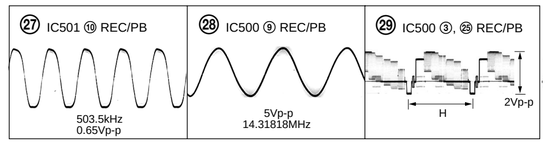
MA-318 (ON SCREEN DISPLAY) SCHEMATIC DIAGRAM
— Ref. No.: MA-318 Board; 1,000 Series —

• See page 4-3 for MA-318 BOARD printed wiring board.



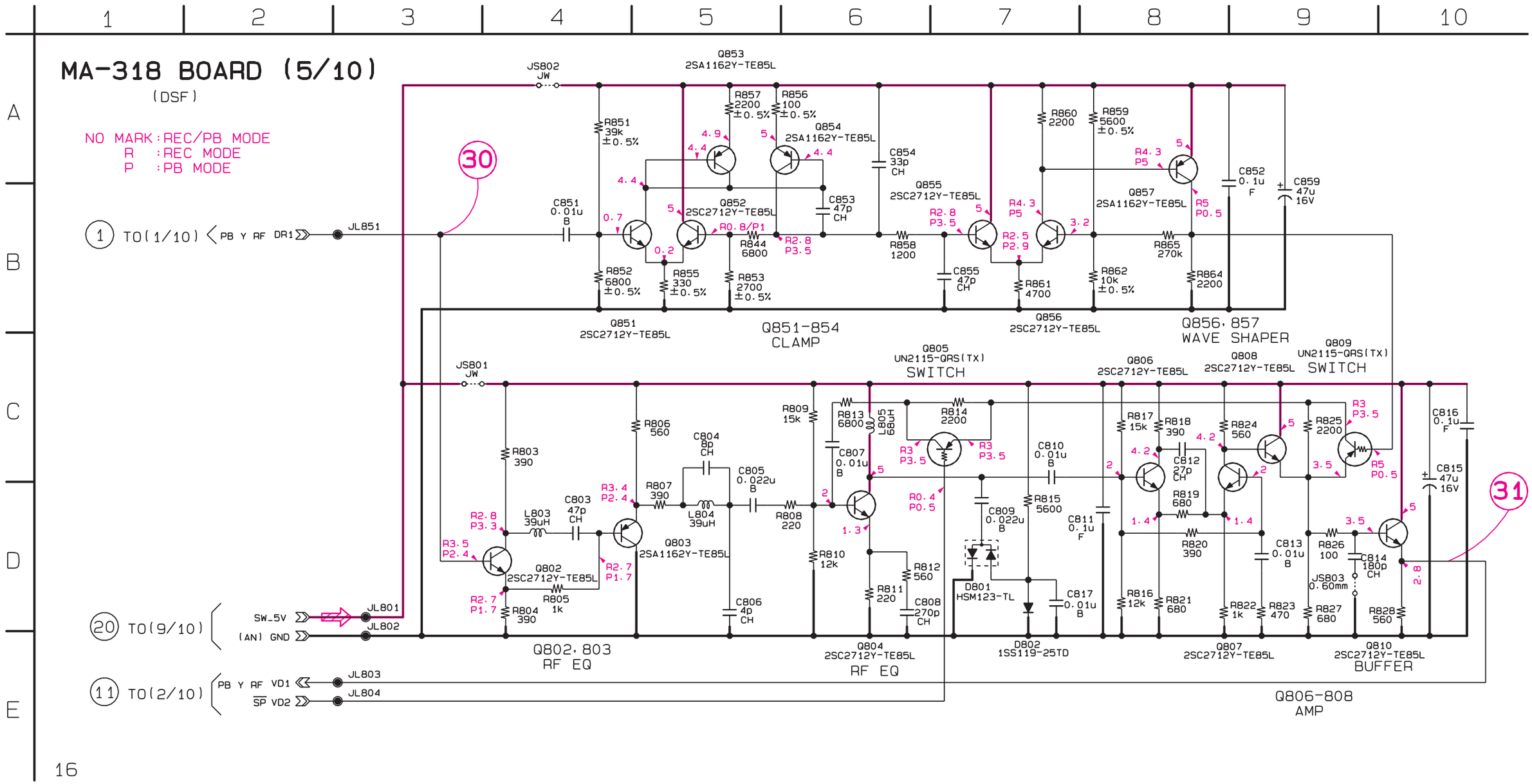
	VIDEO SIGNAL			AUDIO SIGNAL
	CHROMA	Y	Y/CHROMA	
REC			➡	
PB			⇨	

MA-318 BOARD

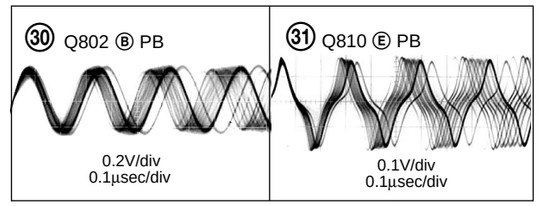


MA-318 (DSF) SCHEMATIC DIAGRAM
— Ref. No.: MA-318 Board; 1,000 Series —

• See page 4-3 for MA-318 BOARD printed wiring board.

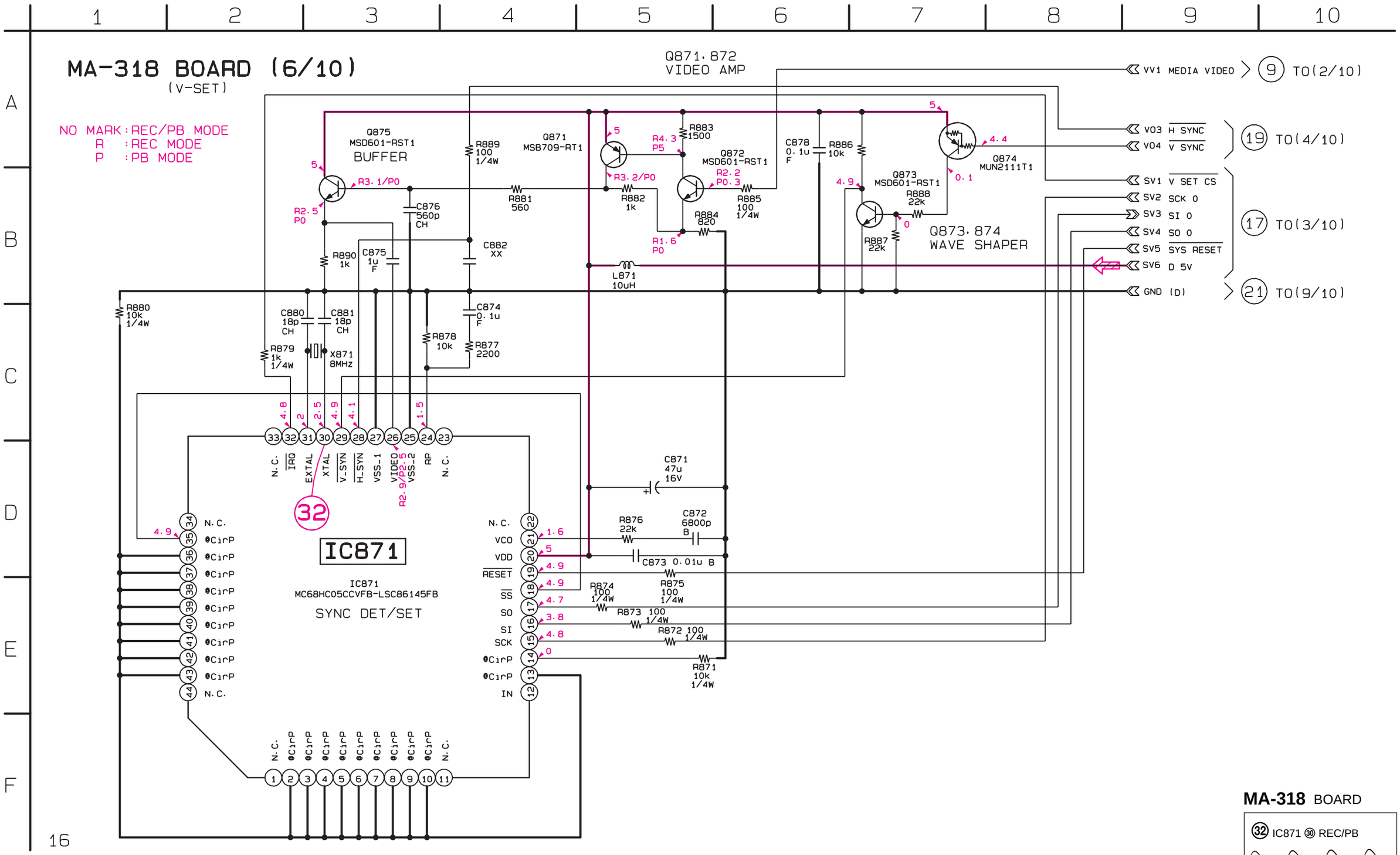


MA-318 BOARD

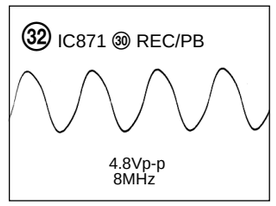


MA-318 (V-SET) SCHEMATIC DIAGRAM
— Ref. No.: MA-318 Board; 1,000 Series —

• See page 4-3 for MA-318 BOARD printed wiring board.

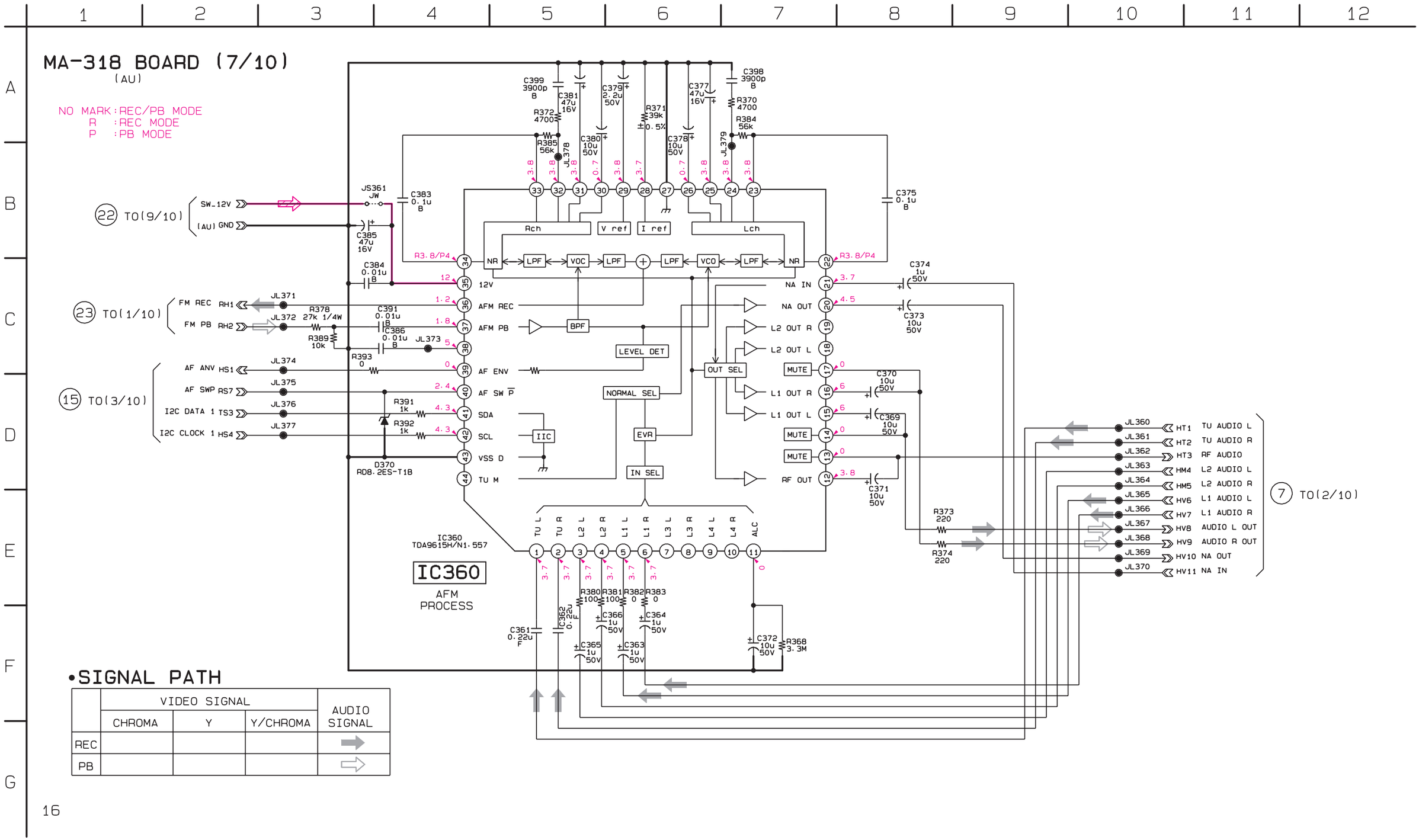


MA-318 BOARD



MA-318 (AFM AUDIO) SCHEMATIC DIAGRAM
— Ref. No.: MA-318 Board; 1,000 Series —

• See page 4-3 for MA-318 BOARD printed wiring board.

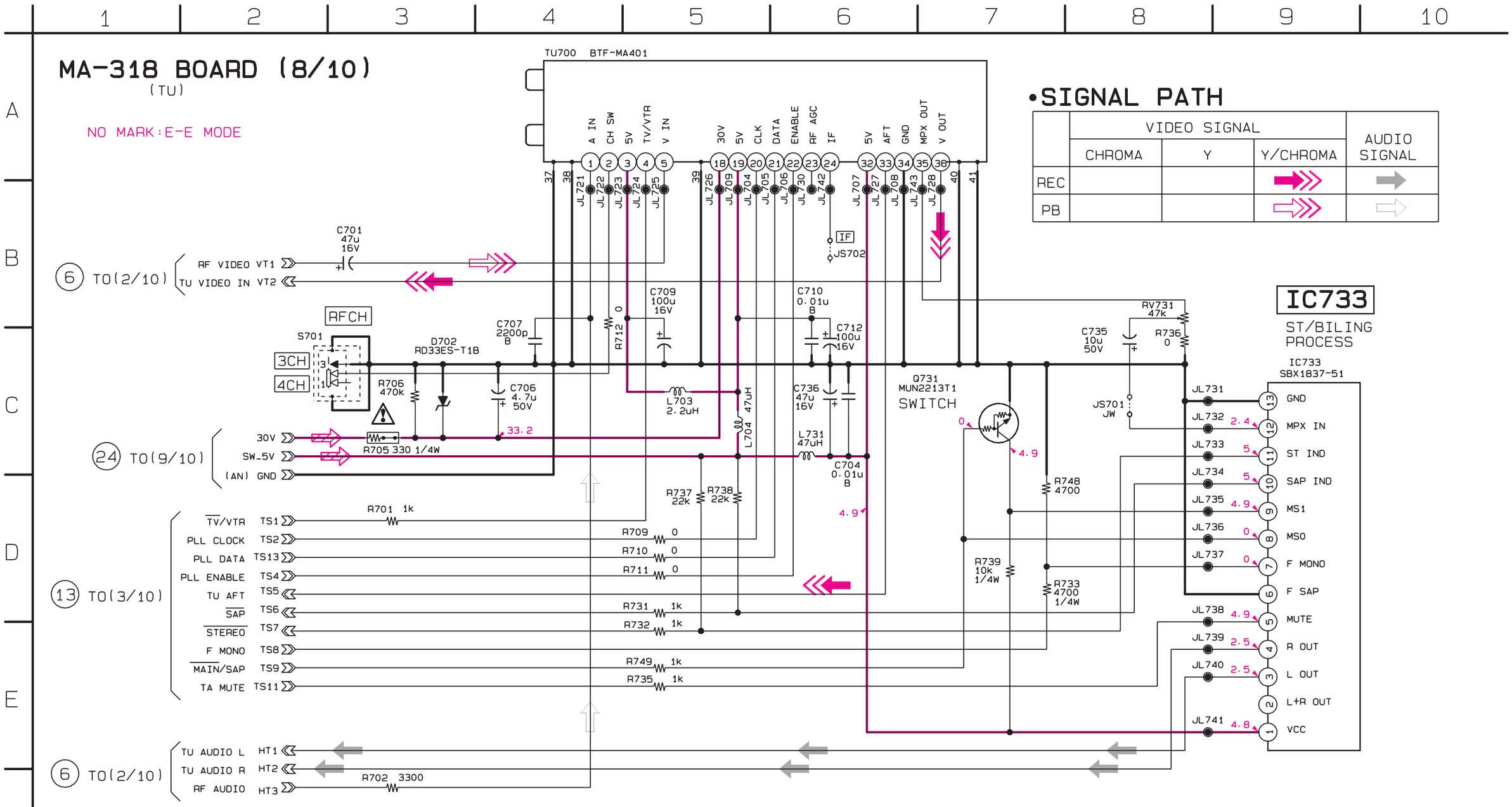


•SIGNAL PATH

	VIDEO SIGNAL			AUDIO SIGNAL
	CHROMA	Y	Y/CHROMA	
REC				⇨
PB				⇨

MA-318 (TUNER) SCHEMATIC DIAGRAM
— Ref. No.: MA-318 Board; 1,000 Series —

• See page 4-3 for MA-318 BOARD printed wiring board.

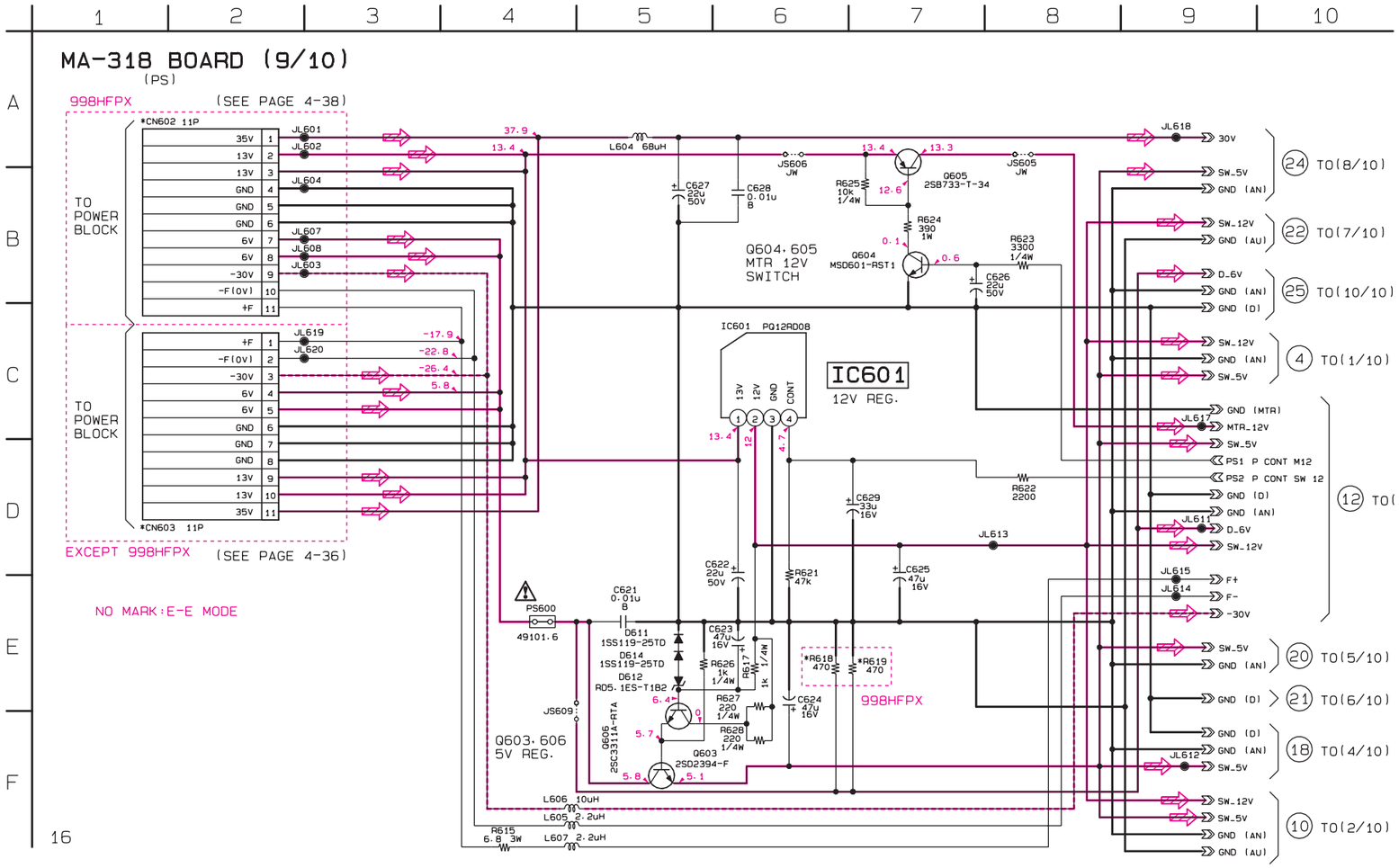


Note:	Note:
The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety. Replace only with part number specified.	Les composants identifiés par une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

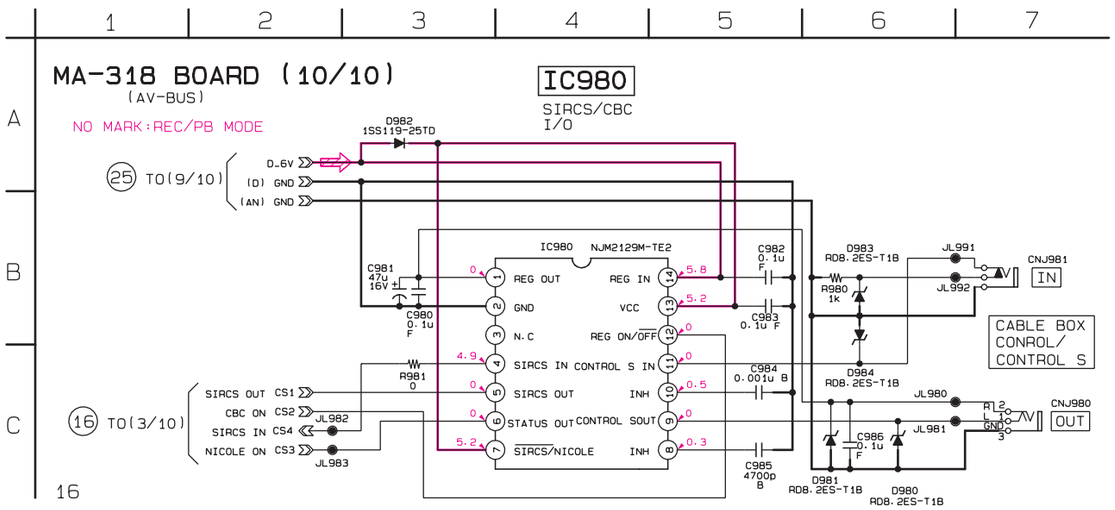
MA-318 (POWER SUPPLY, AV-BUS) SCHEMATIC DIAGRAM

— Ref. No.: MA-318 Board; 1,000 Series —

• See page 4-3 for MA-318 BOARD printed wiring board.

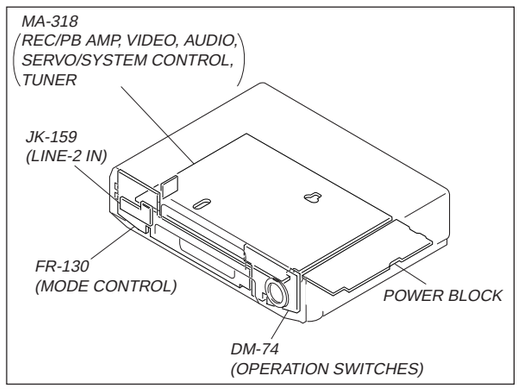


Note:	Note:
The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety. Replace only with part number specified.	Les composants identifiés par une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.



FR-130 (MODE CONTROL) PRINTED WIRING BOARD
— Ref. No.: FR-130 Board; 2,000 Series —

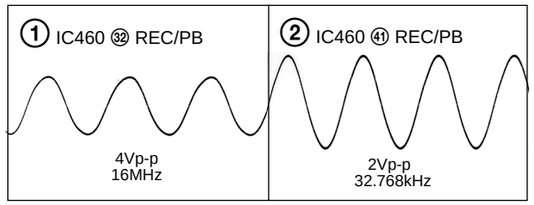
There are few cases that the part printed on this diagram isn't mounted in this model.



FR-130 BOARD

CN460	A-11
CN461	D-1
D420	B-10
D460	A-13
D462	B-10
D463	B-10
IC460	B-11
IC461	B-13
IC462	C-13
IC463	D-13
Q460	B-13

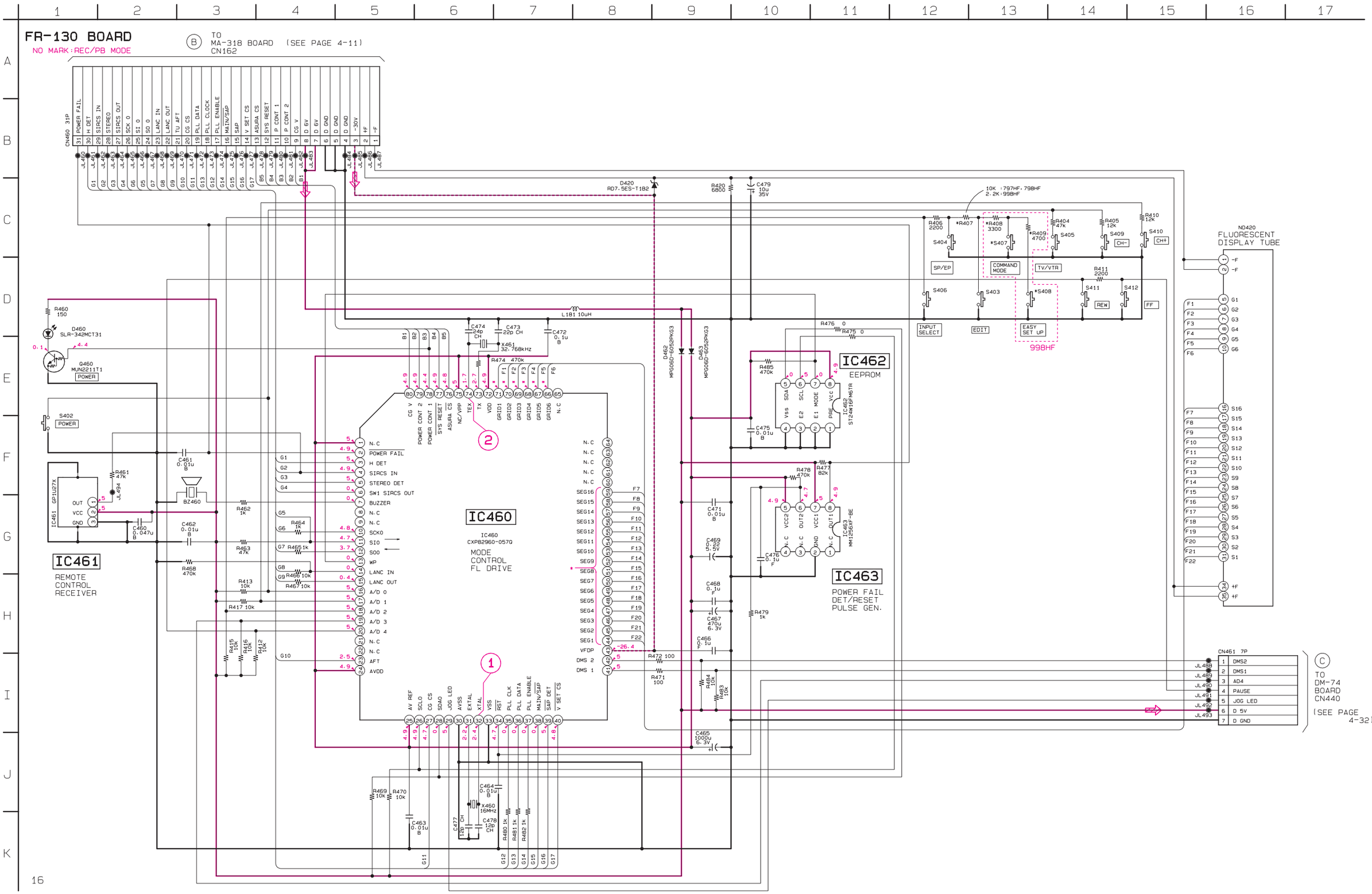
FR-130 BOARD



MODE CONTROL
FR-130

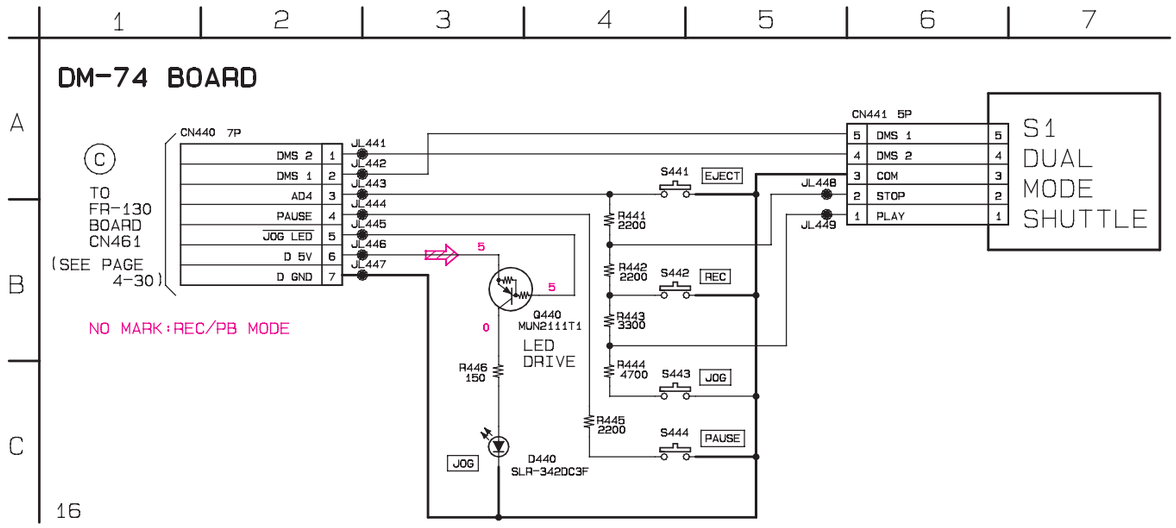
FR-130 (MODE CONTROL) SCHEMATIC DIAGRAM

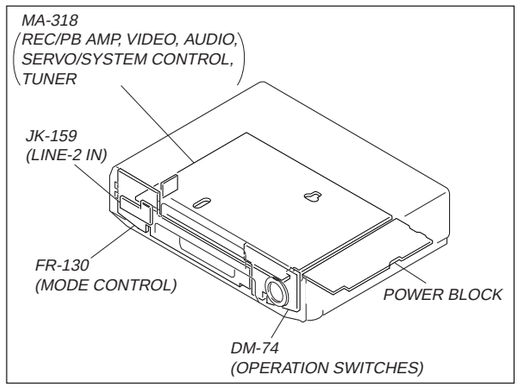
— Ref. No.: FR-130 Board; 2,000 Series —



DM-74 (OPERATION SWITCHES) PRINTED WIRING BOARD AND SCHEMATIC DIAGRAM
— Ref. No.: DM-74 Board; 2,000 Series —

There are few cases that the part printed on this diagram isn't mounted in this model.



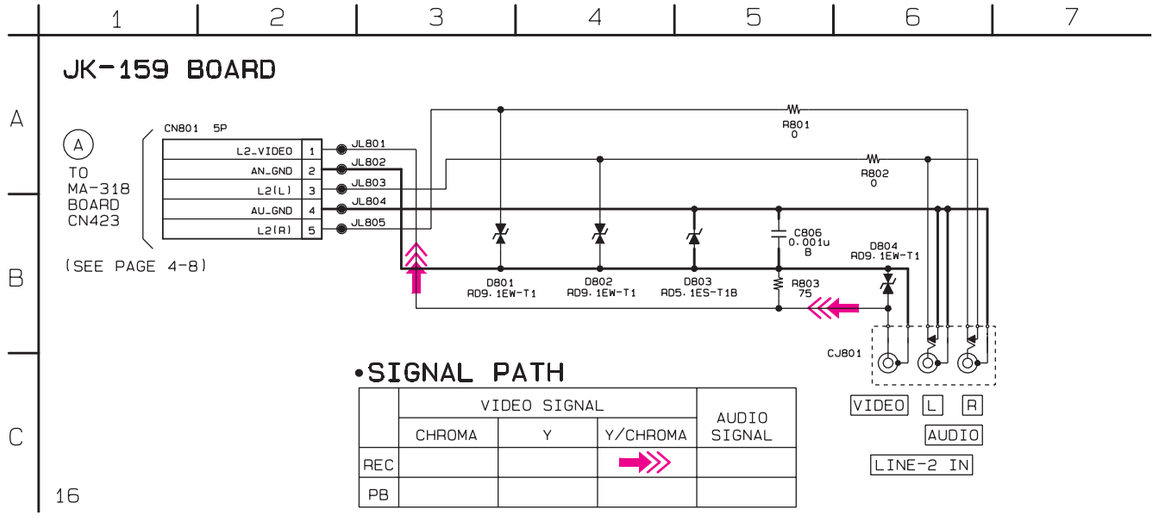


OPERATION SWITCHES
DM-74

There are few cases that the part printed on this diagram isn't mounted in this model.

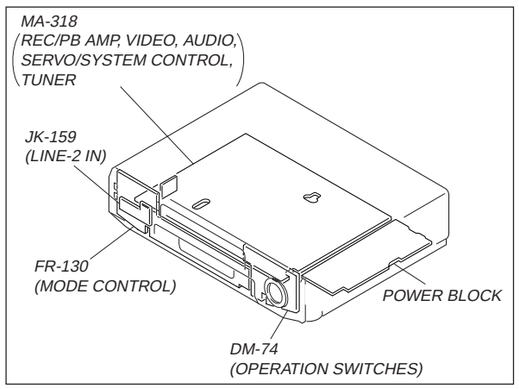
JK-159 (LINE-2 IN) PRINTED WIRING BOARD AND SCHEMATIC DIAGRAM

— Ref. No.: JK-159 Board; 2,000 Series —



•SIGNAL PATH

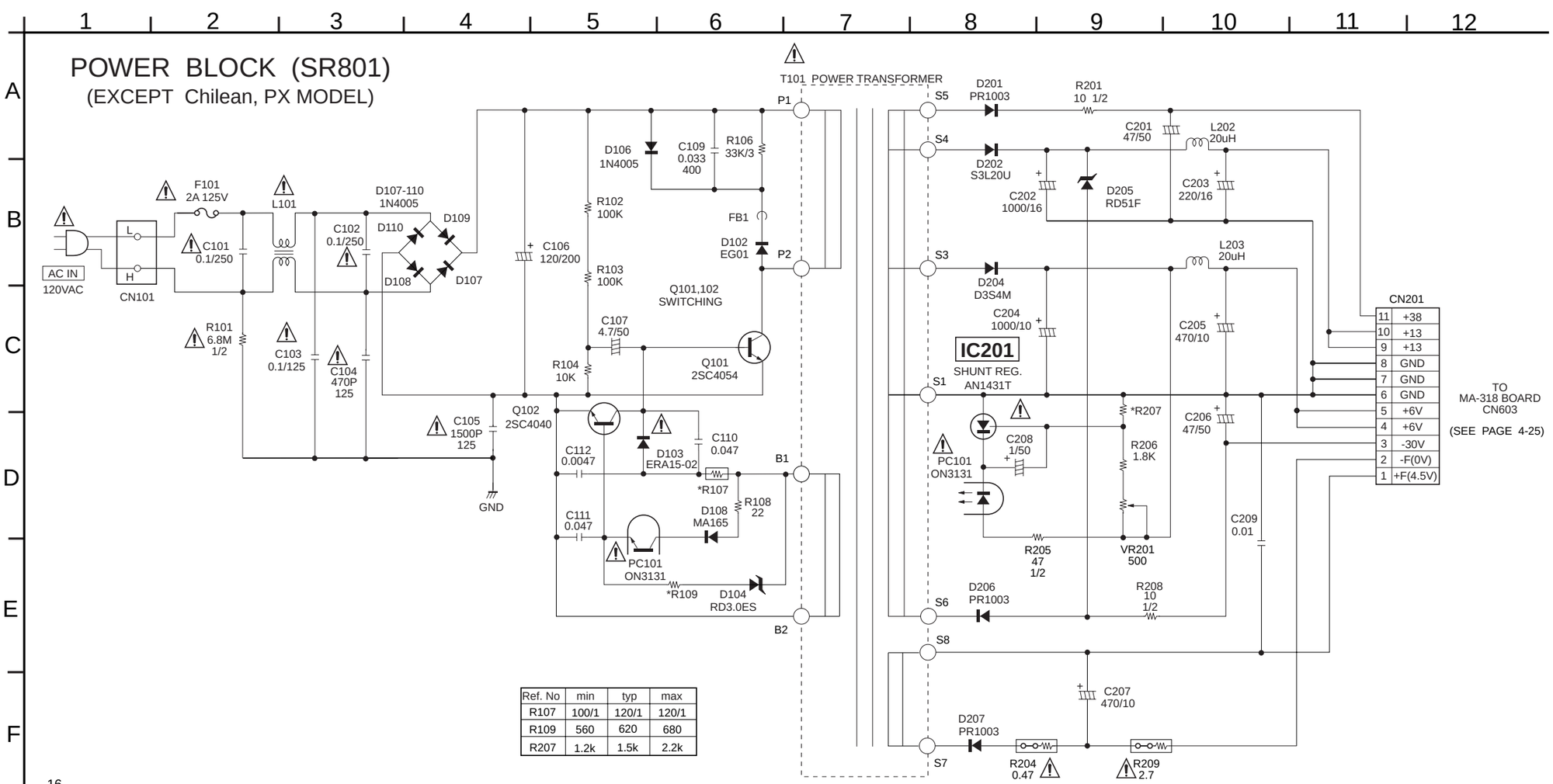
	VIDEO SIGNAL			AUDIO SIGNAL
	CHROMA	Y	Y/CHROMA	
REC			⇉	
PB				



LINE-2 IN
JK-159

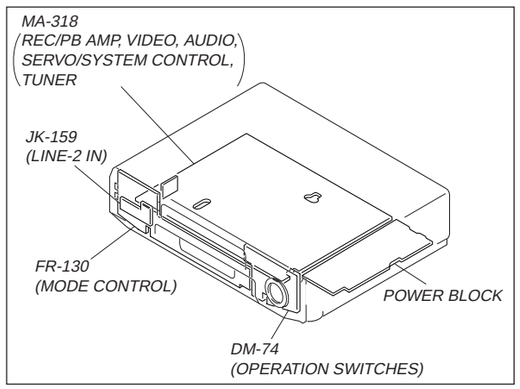
POWER BLOCK SR801 (SWITCHING REGULATOR) PRINTED WIRING BOARD AND SCHEMATIC DIAGRAM
— Ref. No.: SR801 Board; 8,000 Series —

There are few cases that the part printed on this diagram isn't mounted in this model.



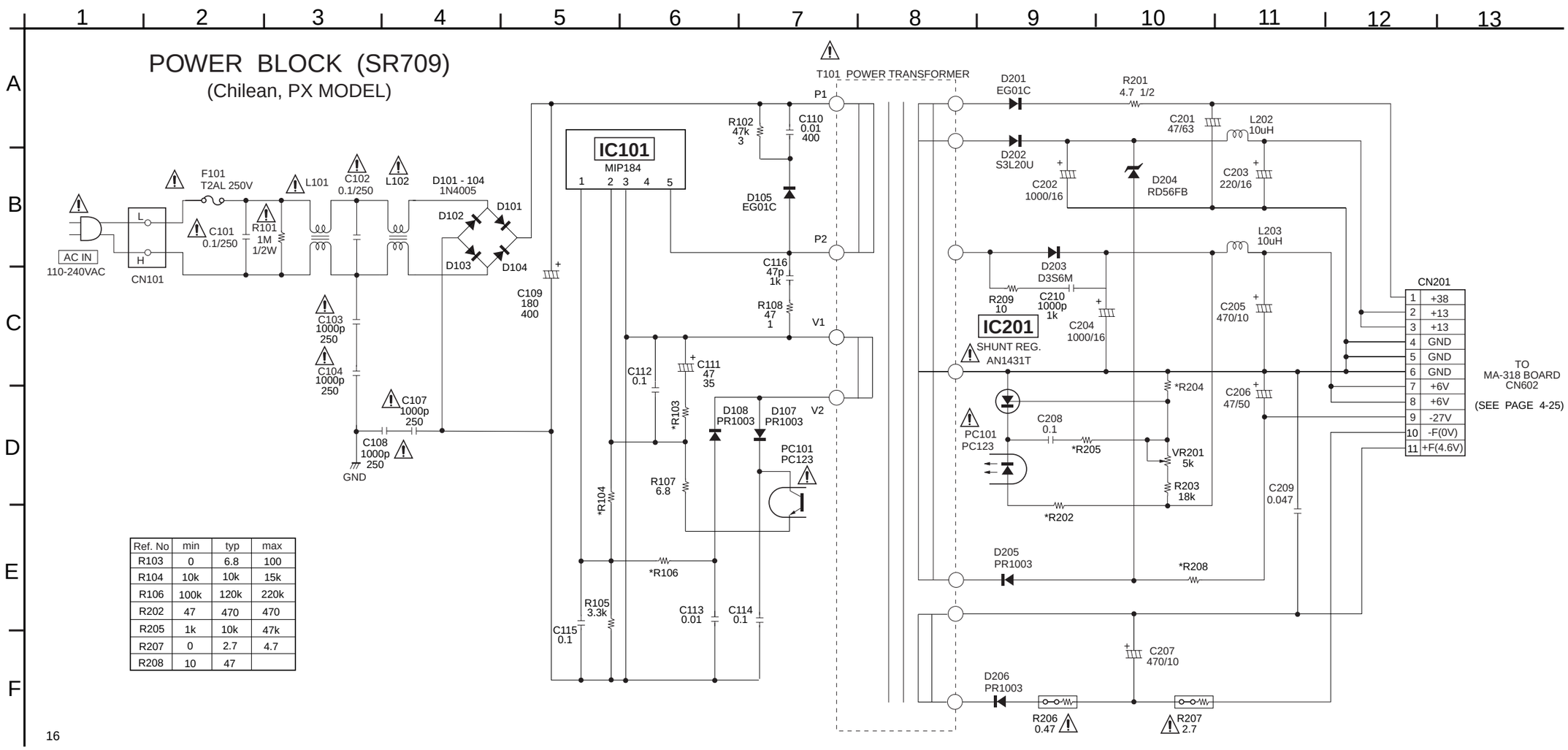
Ref. No	min	typ	max
R107	100/1	120/1	120/1
R109	560	620	680
R207	1.2k	1.5k	2.2k

Note :	**Note :**
The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety. Replace only with part number specified.	Les composants identifiés par une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.



POWER BLOCK SR709 (SWITCHING REGULATOR) PRINTED WIRING BOARD AND SCHEMATIC DIAGRAM
— Ref. No.: SR709 Board; 9,000 Series —

There are few cases that the part printed on this diagram isn't mounted in this model.

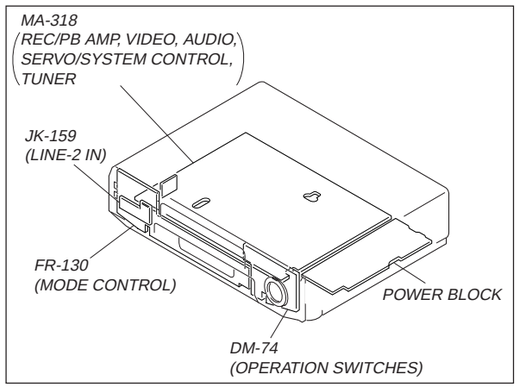


Ref. No	min	typ	max
R103	0	6.8	100
R104	10k	10k	15k
R106	100k	120k	220k
R202	47	470	470
R205	1k	10k	47k
R207	0	2.7	4.7
R208	10	47	

16

Note :
The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

Note :
Les composants identifiés par une marque ⚠ sont critiques pour la sécurité.
Ne les remplacer que par une pièce portant le numéro spécifié.



5-1. SYSTEM CONTROL — VIDEO BLOCK INTERFACE (MA-318 BOARD IC161)

Signal	Pin No.	I/O	STOP FF/REW	TAPE THREADING	TAPE UNTHREADING	PB	PB PAUSE	SLOW	x 2	CUE	REVIEW	REC	REC PAUSE
RF SWP	①	O	*1	*1	*1	*1	*1	*1	*1	*1	*1	*1	*1
QVD	④	O	L	L	L	*2	*3	*3	*2	*3	*3	L	L
V SYNC	⑯	I	*4	*5	*5	*5	*5	*5	*5	*5	*5	*5	*5
NT JUDGE	⑬	O	L	L	L	L	L	L	L	L	L	L	L

*1 Synchronized with drum rotation. 30Hz 50% duty cycle.
*2 Normally “L“. “H“ when CTL signal is not generated.
*3 V period “H“ pulse.
*4 Selected by REC mode. “H“ in LP mode.“
*5 Composite sync signal (positive).

5-2. SYSTEM CONTROL — SERVO PERIPHERAL CIRCUIT INTERFACE (MA-318 BOARD IC161)

Signal	Pin No.	I/O	STOP	FF	REW	TAPE THREADING	TAPE UNTHREADING	PB	PB PAUSE	SLOW	CUE	x 2	REVIEW	REC	REC PAUSE
REC CTL	⑦	O	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z	*1	Hi-Z
CAP STOP	㉟	O (O.D)	L	Hi-Z (O.D)	Hi-Z (O.D)	Hi-Z (O.D)	Hi-Z (O.D)	Hi-Z (O.D)	L	*3	Hi-Z (O.D)	Hi-Z (O.D)	Hi-Z (O.D)	Hi-Z (O.D)	Hi-Z (O.D)
STEP PLS	㊴	O	L	L	L	L	L	L	L	*2	L	L	L	L	L
PB CTL	㊼	I	H	*6	*6			*1	H/L	*2	*6	*6	*6	*1	H
DRM PG	㊽	I	*4	*1	*1	*5	*5	*1	*1	*1	*1	*1	*1	*1	*1
DRM FG	㊾	I	*4	*7	*7	*5	*5	*7	*7	*7	*7	*7	*7	*7	*7
CAP FG	㊿	I	H/L	*6	*6	*5	*5	*6	H/L	*2	*6	*6	*6	*6	H/L
CAP DA	㊸	O	*8	*8	*8	*8	*8	*9	*8	*8	*9	*8	*9	*9	*8
DRM DA	㊹	O	*10	*10	*10	*10	*10	*10	*10	*10	*10	*10	*10	*10	*10
CTL RESET	⑧	I/O	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z	*11	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z

*1. 30Hz pulse.
*2. Pulse at tape running.
*3. Reverse logic pulse of STEP PLS.
*4. “L” when drum rotation stops.
*5. Unstable period pulse.
*6. Pulse in period in proportional to tape speed.
*7. 360Hz pulse.
*8. Pulse at tape running.
*9. Approx. 2 msec period “H” or “L” pulse.
*10. Approx. 1.5 msec period “H” or “L” pulse.
*11. “L” when FWD SLOW, “H” when RVS SLOW.

5-3. SYSTEM CONTROL — MECHANISM INTERFACE (MA-318 BOARD IC161)

Signal	Pin No.	I/O	EJECTED	CASSETTE LOADING	CASSETTE UNLOADING	TAPE THREADING	TAPE UNTHREADING	STOP	FF	REW	PB	PB PAUSE	SLOW	x 2	CUE	REVIEW	REC	REC PAUSE
CAM2	⑨	HI-Z	L	H	L	H	L	*7	*7	*7	*7	*7	*7	*7	*7	*7	*7	*7
MODE 1 (*8)	㉒	I	H	L	L	*1	*1	H	H	H	H	H	H	H	H	L	H	H
MODE 2 (*8)	㉑	I	H	L	L	*1	*1	H	H	H	L	L	L	L	L	L	L	L
MODE 3 (*8)	⑳	I	L	L	L	*1	*1	H	L	L	L	L	L	L	L	H	L	L
MODE 4 (*8)	⑲	I	L	H	H	*1	*1	L	H	H	H	L	L	L	L	L	L	L
(IN REC PRF)	⑮	I	H	*2	*2	*2	*2	*2	*2	*2	*2	*2	*2	*2	*2	*2	*2	*2
T REEL FG	㊹	I	H/L	H/L	H/L	H/L	H/L	H/L	*3	*3	*3	H/L	*3	*3	*3	*3	*3	H/L
S REEL FG	㊸	I	H/L	H/L	H/L	*3	*3	H/L	*3	*3	*3	H/L	*3	*3	*3	*3	*3	H/L
T/E LED	㉜	O (O.D)	*4	*4	*4	*4	*4	*4	*4	*4	*4	*4	*4	*4	*4	*4	*4	*4
$\overline{\text{CAP STOP}}$	㉟	O (O.D)	L	L	L	H	H	L	H	H	H	L	*5	H	H	H	H	L
CAP RVS	㉜	O	H			L	H	H/L	L	H	L	L	L/*5	L	L	H	L	L
T SENS	㊶	I	*4	*4	*4	*6	*6	*6	*6	*6	*6	*6	*6	*6	*6	*6	*6	*6
S SENS	㊷	I	*4	*4	*4	*6	*6	*6	*6	*6	*6	*6	*6	*6	*6	*6	*6	*6

*1. Uncertainly.
*2. "L" when erasing protection tab is bent. "H" when not bent.
*3. Pause of period in proportion to reel rotating speed.
*4. Approx. 2 msec period "H" pulse.
*5. Pulse at tape running.
*6. Normally "L". 2 msec period "H" pulse when tape top or tape end is detected.
*7. When transition to UNLOADING direction : "L".
When transition to LOADING direction : "H".
When CAM MOTOR is stopped : Hi-Z.
*8. When RVS slow : Mode 1="L"
When RVS slow : Mode 2="L"
When RVS slow : Mode 3="H"
When RVS slow : Mode 4="L"

5-4. SYSTEM CONTROL — SYSTEM CONTROL PERIPHERAL CIRCUIT INTERFACE (MA-318 BOARD IC161)

Signal	Pin No.	I/O	I/O Level
$\overline{\text{ASURA RESET}}$	㊵	I	Normally "H", "L" when service interruption is detected or restored.
$\overline{\text{ASURA CS}}$	㊹	I	Chip select signal from timer microprocessor. V period "L" pulse.
S IN 0	㊺	I	Serial communication data from timer microprocessor. V period " L" pulse.
S OUT 0	㊻	O	Serial communication data to timer microprocessor. V period "L" pulse.
S CLK	㊼	I	Serial communication clock from timer microprocessor. V period "L" pulse.

5-5. SYSTEM CONTROL — AUDIO BLOCK INTERFACE (MA-318 BOARD IC161)

Signal	Pin No.	I/O	STOP/FF/ REW	TAPE LOADING	TAPE UNLOADING	PB	PB PAUSE	SLOW	x 2	CUE	REVIEW	REC	REC PAUSE
AF ENV	㊾	I	AF RF envelope signal input terminal for automatic tracking.										
A MUTE	㉛	O (O.D)	L	L	L	*1	H	H	H	H	H	L	L
AF REC $\overline{\text{P}}$	②	O	L	L	L	L	L	L	L	L	L	H	L
AF SWP	⑱	O	*1	*1	*1	*1	*1	*1	*1	*1	*1	*1	*1
FULL ERS	㊱	O (O.D)	H	H	H	H	H	H	H	H	H	L	H

*1. 30 Hz 50 % duty pulse approx. 5 msec delayed from RF SW P.

5-6. SERVO/SYSTEM CONTROL MICROPROCESSOR PIN FUNCTIONS (MA-318 BOARD IC161)

Pin No.	Pin Name	I/O	Function
1	RF SWP	O	RF switching pulse output.
2	AF REC $\overline{P}$	O	"H" when HiFi audio REC.
3	N.C.	—	Not used.
4	QVD	O	Quasi VD pulse output.
5	AUTO PRESET	O	"H" during auto preset.
6	FE ON	O	Flying erase ON/OFF
7	REC CTL	O	REC CTL signal output.
8	CTL RESET	O	Capstan current control. "H" during slow mode.
9	CAM 2	I	Cam motor control.
10	N.C.	—	Not used.
11	TA MUTE	O	Tuner audio mute. H: Mute
12	$\overline{\text{S-VHS}}$	I	Not used.
13	NT JUDGE	I	Not used.
14	MESECAM DET	I	Not used.
15	CIN (REC PRF)	I	Erasing protection tab, cassette in detection signal input.
16	AV CONT	O	Not used.
17	$\overline{\text{SECAM ON}}$	—	Not used.
18	SW1	—	Not used.
19	MODE 4	I	Cam encoder signal input.
20	MODE 3	I	Cam encoder signal input.
21	MODE 2	I	Cam encoder signal input.
22	MODE 1	I	Cam encoder signal input.
23	POWER SAVE CONT 1	O	Not used.
24	POWER SAVE C+	O	Not used.
25	MOD CONT	O	Not used.
26	$\overline{\text{TV}}$/VTR	O	$\overline{\text{TV}}$/VTR control signal output.
27	N.C.	—	Not used.
28	SDA 0	I/O	I^2C data.
29	N.C.	—	Not used.
30	SCL 0	I/O	I^2C clock.
31	A MUTE	O	"H" when audio mute.
32	T/E LED	O	Tape top/end sensors driver.
33	N.C.	—	Not used.
34	N.C.	—	Not used.
35	$\overline{\text{CAP STOP}}$	O	Capstan stop signal output.
36	FULL ERS	O	Full erase control.
37	N.C.	—	Not used.
38	N.C.	—	Not used.
39	MP	I	Fixed to "L".
40	$\overline{\text{ASURA RESET}}$	I	System reset signal.
41	VSS	—	Ground.
42	XTAL	O	System clock 16MHz.
43	EXTAL	I	System clock 16MHz.
44	$\overline{\text{ASURA CS}}$	I	Servo/system control microcomputer chip select signal.
45	S IN 0	I	Serial communication signal.
46	S OUT 0	O	Serial communication signal.
47	$\overline{\text{SCLK}}$	I	Serial communication signal.
48	NICOL ON	O	NICOL control signal out.
49	CBC POWER	O	Cable box control signal out.
50	F. MONO	O	Forced mono.

Pin No.	Pin Name	I/O	Function
51	SW2	O	Not used.
52	AVSS	—	Unswitched ground.
53	AVREF	—	AD port reference input UNSW 5V.
54	AVDD	—	UNSW 5V.
55	NTPB SW	I	Not used.
56	AV ADJ	I	Adjustment mode.
57	$\overline{\text{FOLLOW TV}}$	I	Not used.
58	N.C.	—	Not used.
59	AF ENV	I	HiFi audio playback signal envelope.
60	RF ENV	I	Video playback signal envelope.
61	T SENS	I	Take-up end sensor.
62	S SENS	I	Supply end sensor.
63	S REEL FG	I	Supply reel FG input.
64	T REEL FG	I	Take-up reel FG input.
65	N.C.	—	Not used.
66	VSYNC	I	Composite sync. signal input.
67	$\overline{\text{PB CTL}}$	I	Playback CTL input.
68	DRM PG	I	Drum PG input.
69	DRM FG	I	Drum FG input.
70	CAP FG	I	Capstan FG input.
71	BLUE BACK ON	O	Not used.
72	CAP RVS	O	Capstan reverse control "H" when reverse.
73	CAP DA	O	Capstan error D/A output.
74	DRM DA	O	Drum PG output.
75	N.C.	—	Not used.
76	N.C.	—	Not used.
77	REC COUNT	I	Counter signal input when recording.
78	C PLUS DET	O	Not used.
79	N.C.	—	Not used.
80	DATA (SSB)	O	Serial communication data.
81	CLOCK (SSB)	O	Serial communication clock.
82	N.C.	—	Not used.
83	N.C.	—	Not used.
84	CAP TRQ PWM	O	PWM output for capstan torque control.
85	N.C.	—	Not used.
86	N.C.	—	Not used.
87	N.C.	—	Not used.
88	VSS	—	Ground.
89	VDD	—	5V.
90	5V	—	5V.
91	N.C.	—	Not used.
92	CTL HYS HIGH	O	CTL amp gain control.
93	N.C.	—	Not used.
94	N.C.	—	Not used.
95	N.C.	—	Not used.
96	AF REC	O	"H" output when hifi audio recording.
97	N.C.	—	Not used.
98	N.C.	—	Not used.
99	STEP PLS	O	Step pulse "H" when capstan step driving.
100	AF SWP	O	AF switching pulse output.

5-7. TUNER/TIMER MODE CONTROL PIN FUNCTIONS (FR-130 BOARD IC460)

Pin No.	Pin Name	I/O	Function
1	N.C.	I	Not used.
2	$\overline{\text{POWER FAIL}}$	I	Power failure detect signal input.
3	H DET	I	H DET_(TUNER H SYNC detect input).
4	SIRCS IN	I	Remote control signal (SIRCS) input.
5	STEREO DET	I	Stereo judge input.
6	SW1 SIRCS OUT	O	Remote control signal (SIRCS) output.
7	BUZZER	O	Buzzer signal output.
8	N.C.	O	Not used.
9	N.C.	O	Not used.
10	SCK 0	I	Serial communication signal (Serial clock).
11	SI 0	I	Serial communication signal (Data input).
12	SO 0	O	Serial communication signal (Data output).
13	WP	O	EEP mode control.
14	LANC IN	I	LANC input.
15	LANC OUT	O	LANC output.
16	A/D 0	I	Analog voltage (KEY) input.
17	A/D 1	I	Analog voltage (KEY) input.
18	A/D 2	I	Analog voltage (KEY) Input.
19	A/D 3	I	Analog voltage (KEY) Input.
20	A/D 4	I	Analog voltage (KEY) Input.
21	N.C.	I	Not used.
22	N.C.	I	Not used.
23	AFT	I	AFT (Auto fine tuning signal input).
24	AVDD		A/D port reference input.
25	AV REF		UNSW 5V.
26	SCL 0	O	T BUS (clock) /IIC BUS (clock).
27	CG CS	O	Character generator chip select signal.
28	SDA 0	O	IIC BUS (data).
29	JOG LED	O	JOG LED control signal output.
30	AVSS	I	UNSW GND
31	EXTAL		System clock terminal (16MHz).
32	XTAL		System clock terminal (16MHz).
33	VSS		GND
34	$\overline{\text{RST}}$	I	RESET input.
35	PLL CLK	O	TUNER PLL clock.
36	PLL DATA	O	TUNER PLL data.
37	PLL ENABLE	O	TUNER chip select.
38	MAIN/SAP	O	NO USE (MAIN/SAP judge signal output).
39	$\overline{\text{SAP}}$ DET	O	MAIN/SAP judge input.
40	$\overline{\text{V SET CS}}$	O	V SET IC chip select signal.
41	DMS 1	I	DMS forward/reverse signal input.
42	DMS 2	I	DMS forward/reverse signal input.
43	VFDP	I	VFDP.
44	SEG1	O	Segment terminal 1
45	SEG2	O	Segment terminal 2
46	SEG3	O	Segment terminal 3
47	SEG4	O	Segment terminal 4
48	SEG5	O	Segment terminal 5
49	SEG6	O	Segment terminal 6

Pin No.	Pin Name	I/O	Function
50	SEG7	O	Segment terminal 7
51	SEG8	O	Segment terminal 8.
52	SEG9	O	Segment terminal 9.
53	SEG10	O	Segment terminal 10.
54	SEG11	O	Segment terminal 11.
55	SEG12	O	Segment terminal 12.
56	SEG13	O	Segment terminal 13.
57	SEG14	O	Segment terminal 14.
58	SEG15	O	Segment terminal 15.
59	SEG16	O	Segment terminal 16.
60	NC		Non Connect.
61	NC		Non Connect.
62	NC		Non Connect.
63	NC		Non Connect.
64	NC		Non Connect.
65	NC		Non Connect.
66	GRID6	O	Grid terminal 6.
67	GRID5	O	Grid terminal 5.
68	GRID4	O	Grid terminal 4.
69	GRID3	O	Grid terminal 3.
70	GRID2	O	Grid terminal 2.
71	GRID1	O	Grid terminal 1.
72	VDD		D5V
73	TX		Timer clock terminal (32.768kHz).
74	TEX		Timer clock terminal (32.768kHz).
75	NC/VPP	O	D5V
76	ASURA CS	O	S/S microcomputer chip select signal.
77	$\overline{\text{SYS RESET}}$	O	System reset output.
78	POWER CONT 1	O	Power supply control signal.
79	POWER CONT 2	O	Power supply control signal.
80	CG V	I	Composite sync input.

SECTION 6
ADJUSTMENTS

6-1 MECHANICAL ADJUSTMENTS

For the mechanical adjustments, please refer to the "VHS MECHANICAL ADJUSTMENT MANUAL Ⅵ (S MECHANISM)" (9-921-647-11).

6-2. ELECTRICAL ADJUSTMENTS

See the adjusting parts location diagram from on page 6-8 for the adjustment.

2-1. PREPARATION BEFORE ADJUSTMENT

2-1-1. Equipment Required

The measuring instruments used for this alignment include:

1) Monitor TV
2) Oscilloscope, dual-trace, bandwidth of 30MHz or more, with delay mode (A probe 10:1 should be used unless otherwise specified.)
3) Frequency counter
4) Pattern generator
5) Digital voltmeter
6) Audio generator
7) Audio level meter
8) Audio distortion meter
9) Audio attenuator
10) Alignment tapes
    KRV-51N2 Part No.: 8-192-605-32

2-1-2. Equipment Connection

Unless otherwise specified, connect and adjust the measuring instruments as shown in the following diagram.

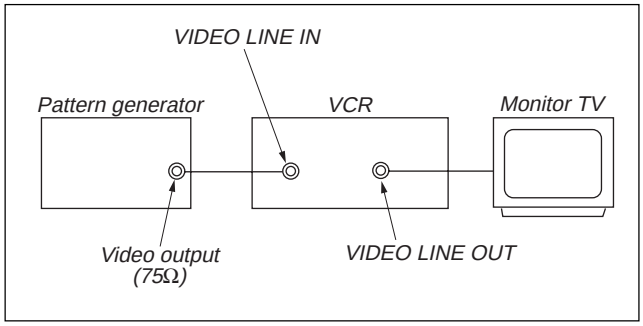


Fig. 6-2-1.

2-1-3. Input Signal Check

Video signal produced by a pattern generator is used as an adjustment signal to perform electrical alignment for this unit. This video signal must satisfy the specification.

Unless otherwise specified, place the switches and controls of this unit in the following positions:

• INPUT SELECT switch ..... LINE or LINE 1 (Remote commander)

Connect an oscilloscope to the Video Input terminal. Check that the synchronizing signal of the Y signal has an amplitude of approximately 0.7V and that the burst signal has an amplitude of approximately 0.3V and its waveform is flat. And check that the level ratio of burst signal to "red" signal is 0.30 : 0.66. The video signal (color bar) used for electrical aligning this unit is shown in Fig. 6-2-2.

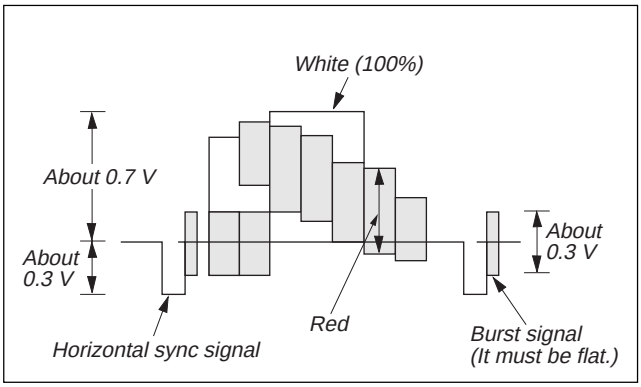


Fig. 6-2-2. Color Bar Signals of Pattern Generator

2-1-4. Alignment Tape

• Contents of KRV-51N2

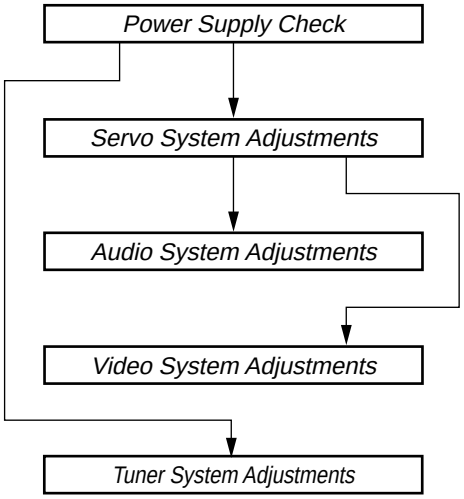
	Mode	Period	Video signal	Audio signal	
				Hi-Fi	Normal
1	SP	7 minutes	Color bar	400Hz	400Hz
2		3 minutes	Monoscope		
3	EP	7 minutes	Color bar		
4		3 minutes	Monoscope		

2-1-5. Input/Output Levels and Impedance

Video input: LINE IN
Input signal: 1Vp-p, 75ohms, unbalanced, sync negative
Video output: LINE OUT
Output signal: 1Vp-p, 75ohms, unbalanced, sync negative
Audio input: LINE IN
Input level: –7.5 dBs
(0dBs= 0.775Vrms)
Input impedance: more than 47 kilohms
Audio output: LINE OUT
Standard level: –7.5dBs at load impedance 47 kilohms
Output impedance: less than 10 kilohms

2-1-6. Adjustment Sequence

The adjustments should be performed in the following sequence.



2-2. POWER SUPPLY CHECK

2-2-1. Output Voltage Check (MA-318 Board)

Mode	E-E
Measuring Instrument	Digital voltmeter
SW 12V Check	
Measurement point	IC601 pin ②
Specified value	12.0 ± 0.3V
MTR12V Check	
Measurement point	Q605 Ⓒ
Specified value	13.2 ± 1.0V
SW5V Check	
Measurement point	Q603 Ⓔ
Specified value	5.1 ± 0.3V

[Check Method]

1) Each of these supply voltages must meet its specified value.

2-3. SERVO SYSTEM CHECK

Unless otherwise specified, set the switches to the following positions.

- INPUT SELECT switch ..... LINE or LINE 1 (Remote commander)
- TAPE SPEED switch ..... SP (Remote commander)

2-3-1. RF Switching Position/ AF Switching Position Adjustments (MA-318 Board)

[Adjustment Purpose]

To adjust the link of the A-ch and B-ch of the tape playback outputs. To make the unit compatible with other tapes and units. If this specification is not satisfied, the link will appear on the screen and the screen will be disrupted, etc.

Mode	Playback
Signal	Alignment tape: SP color bar portion
Measurement point	CH1: Video LINE OUT (RF switching position) CN341 pin ① (HF ADJ) (AF switching position) CH2: CN261 pin ③ (RF SWP)
Measuring instrument	Oscilloscope
Specified value	6.5 ± 0.5H (410 ± 32 µsec)

[Adjustment Method]

1) Short-circuit between JS161 and ground for about 1 second to activate the RF switching position adjustment mode.
2) Check that "AP" is indicated on FL display.
3) Using the channel + and – buttons, adjust to 410 ± 32 µsec (6.5 ± 0.5H).
4) Press the PAUSE button. (Adjustment is over for mono models.)
5) The set goes to the AF switching position adjustment mode.
6) Check that "AH" is indicated on FL display.
7) Using the channel + and – buttons, minimize a chipped portion. At this time, confirm that a noisy sound is not heard.
8) Press the PAUSE button.
9) Check that "AH" indication is disappeared. When it is not disappeared, repeat from the item 1).
10) Press the STOP button.
11) Press the EJECT button.

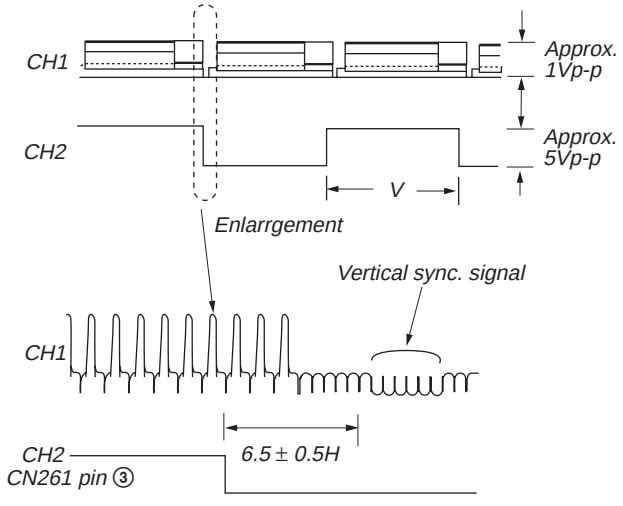


Fig. 6-2-3.

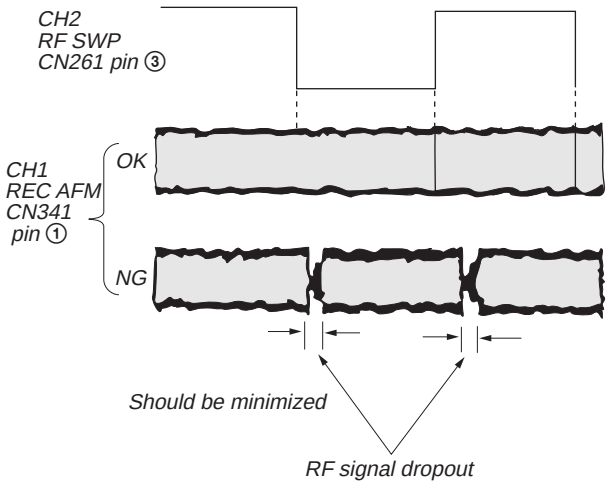


Fig. 6-2-4.

2-4. VIDEO SYSTEM CHECKS AND ADJUSTMENT

For the video system checks, follow the checking procedures given below as a rule. The color bar video signal supplied from the pattern generator is used as the video input signal for the video system adjustment of the recording mode. Check that the signal satisfies the specified value designated in the "Check of input signal" (Fig. 6-2-2)

Unless otherwise specified, set the switches to the following positions.

- INPUT SELECT switch ..... LINE or LINE 1 (Remote commander)
- TAPE SPEED switch ..... SP (Remote commander)

[Checking Sequence]

1) X'tal OSC Check
2) SYNC AGC Check
3) Recording Y Level Check
4) Recording Chroma Level Check
5) Playback Level Check

2-4-1. X'tal OSC Check (MA-318 Board)

Mode	Playback
Signal	Alignment tape: SP Color bar portion
Measurement point	IC201 pin ㊺
Measuring instrument	Oscilloscope and Frequency counter
Specified value	3,579,545 ± 70Hz

Note: A frequency counter should be connected through a buffer amplifier (oscilloscope, etc.) having a high impedance and a low capacitance.

[Check Method]

1) Check that the oscillation frequency satisfies the specified value and that the oscillation voltage is 500 ± 200mVp-p.

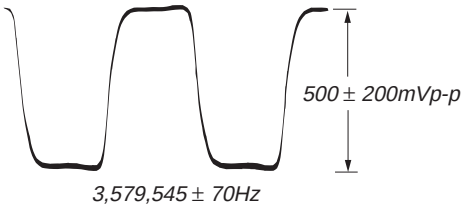


Fig. 6-2-5.

2-4-2. SYNC AGC Check (MA-318 Board)

Mode	E-E
Signal	Color bar
Measurement point	IC201 pin ㊳
Measuring instrument	Oscilloscope
Specified value	A=2.10 ± 0.10Vp-p

[Check Method]

1) Check that the Video signal level (A) satisfies the specified value.

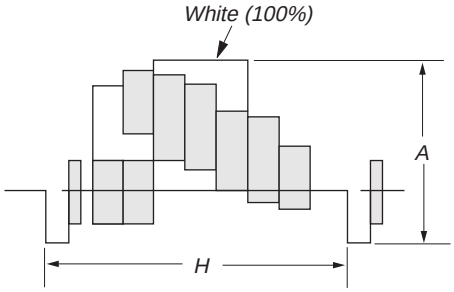


Fig. 6-2-6.

2-4-3. Recording Y Level Check (MA-318 Board)

Mode	E-E (SP)
Signal	No-signal
Measurement point	IC201 pin ⑱
Measuring instrument	Oscilloscope
Specified value	A=290 ± 70mVp-p

[Check Method]

1) Check that the recording RF signal satisfies the specified value.

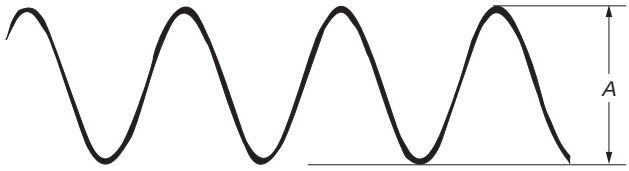


Fig. 6-2-8.

2-4-4. Recording Chroma Level Check (MA-318 Board)

Mode	Recording (SP)
Signal	Color bar
Measurement point	IC201 pin ⑭
Measuring instrument	Oscilloscope
Specified value	A=380 ± 70mVp-p

[Check Method]

1) Confirm the amplitude of recording chroma level becomes the specified value.

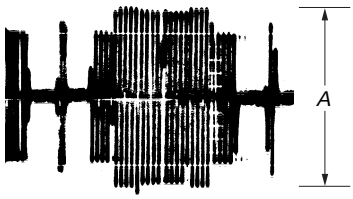


Fig. 6-2-9.

2-4-5. Playback Level Check (MA-318 Board)

Mode	Playback
Signal Alignment	Alignment tape : SP mode color bar portion
Measurement point	Video LINE OUT terminal
Measuring instrument	Oscilloscope
Specified value	A=1.0 ± 0.1Vp-p (75Ω terminated)

[Check Method]

1) Check that the playback level satisfies the specified value.

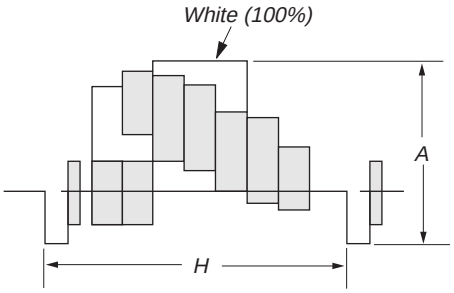


Fig. 6-2-10.

2-5. AUDIO SYSTEM ADJUSTMENT

- For the adjustment of the audio system, perform in the SP mode if there is no special notes. Use the alignment tape.

[Connecting Instruments]

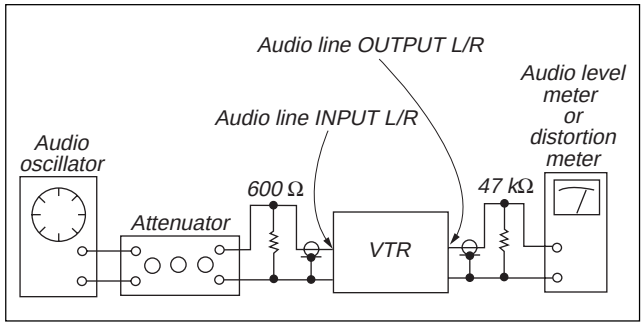


Fig. 6-2-11.

- Adjust in the SP mode if there is no special indications.
- Perform the adjustment setting the switch on the following positions.
- INPUT SELECT switch ..... LINE or LINE 1 (Remote commander)

[Adjustment Method]

1. ACE head adjustment.....Refer to the VHS mechanical adjustment manual Ⅵ (S MECHANISM)(9-921-647-11).
2. E-E output level check
3. Overall Output level and distortion factor check
4. Overall noise level check.

2-5-1. ACE Head Adjustment

Refer to the VHS mechanical adjustment manual Ⅵ (S MECHANISM)(9-921-647-11).

2-5-2. E-E Output Level Check

Mode	E-E
Signal	400Hz, –7.5dBs : CJ570
Measurement point	CJ570
Measuring instrument	Audio level meter
Specified value	–7.5 ± 2dBs

[Check Method]

1) Input signal of 400Hz and –7.5dBs to the CJ461 L/R.
2) Check that the audio output level is –7.5 ± 3dBs.

2-5-3. Overall Output Level and Distortion Factor Check

Mode	Self-record playback
Signal	400Hz, –7.5dBs : CJ570
Measurement point	CJ570
Measuring instrument	Audio level meter and Distortion meter
Specified value	Playback Level: –7.5 ± 3dBs Distortion: 4.0% or less

[Check Method]

1) Input signal of 400Hz and –7.5dBs to the audio input.
2) Record signal.
3) Playback the recorded portion.
4) Check that the output level is –7.5 ± 3dBs.
5) Check that the distortion factor is 4.0% or less.

2-5-4. Overall Noise Level Check

Mode	Self-record playback
Signal	No signal (Insert a shorting plug into the Audio LINE IN terminal)
Measurement point	CJ570
Measuring instrument	Audio level meter
Specified value	– 45.5dBs or less

[Check Method]

1) Record.
2) Playback recorded portion.
3) Check that noise level is – 45.5dBs or less.

2-6. TUNER SYSTEM ADJUSTMENT

2-6-1. Separation Adjustment (MA-318 Board)

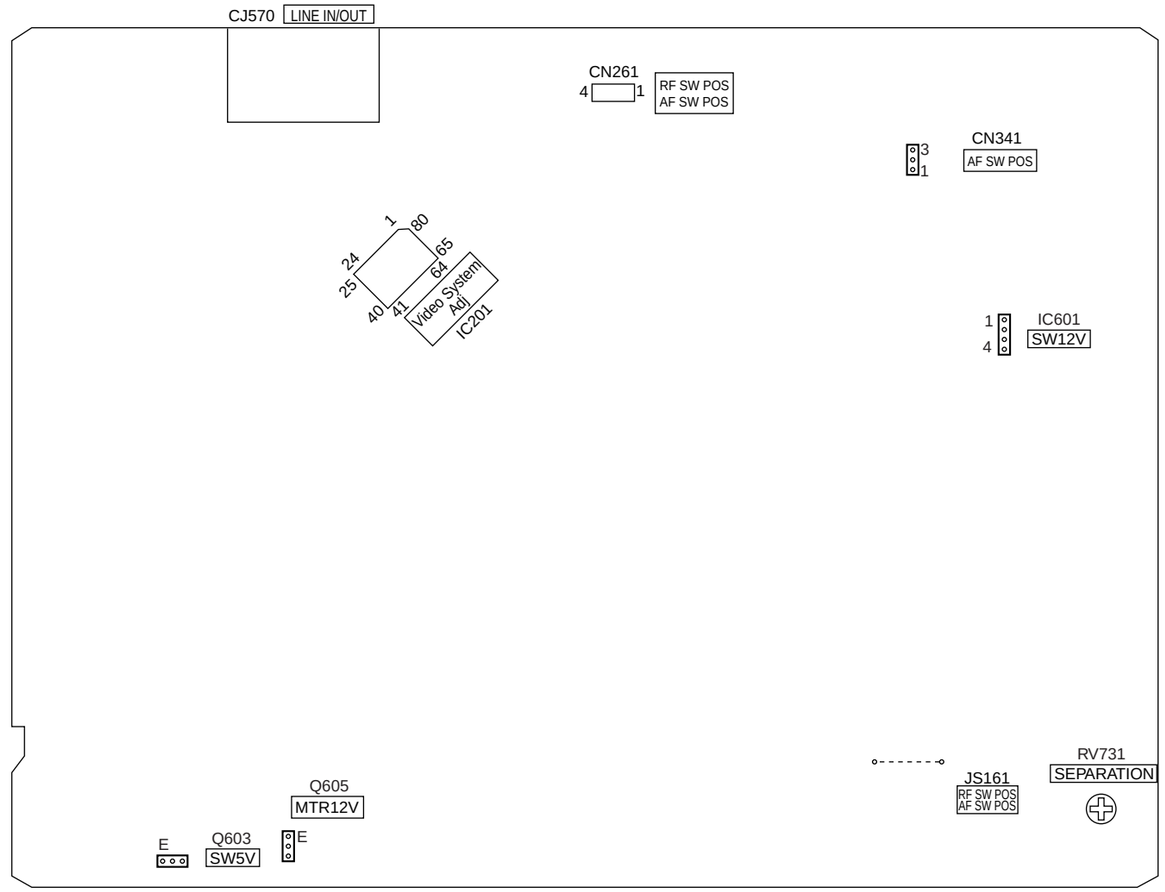
Mode	E-E
Signal	RF signal Video : Color bar white (100%) modulation Audio : L: 400Hz, R: 2kHz 30% modulation Electrical field: 60-80dBm/75Ω terminated
Measuring instrument	Audio level meter
Measuring point	LINE OUT L
Adjusting element	RV731
Specified value	2kHz component minimum

[Adjustment Method]

1) Connect an audio level meter to LINE OUT L channel via HPF.
2) Feed the RF signal from RF IN terminal.
3) Adjust with RV731 so that the output level satisfies the specified value.

2-7. ADJUSTING PARTS LOCATION DIAGRAM

MA-318 BOARD (CONDUCTOR SIDE)



SECTION 7
REPAIR PARTS LIST

7-1. EXPLODED VIEWS

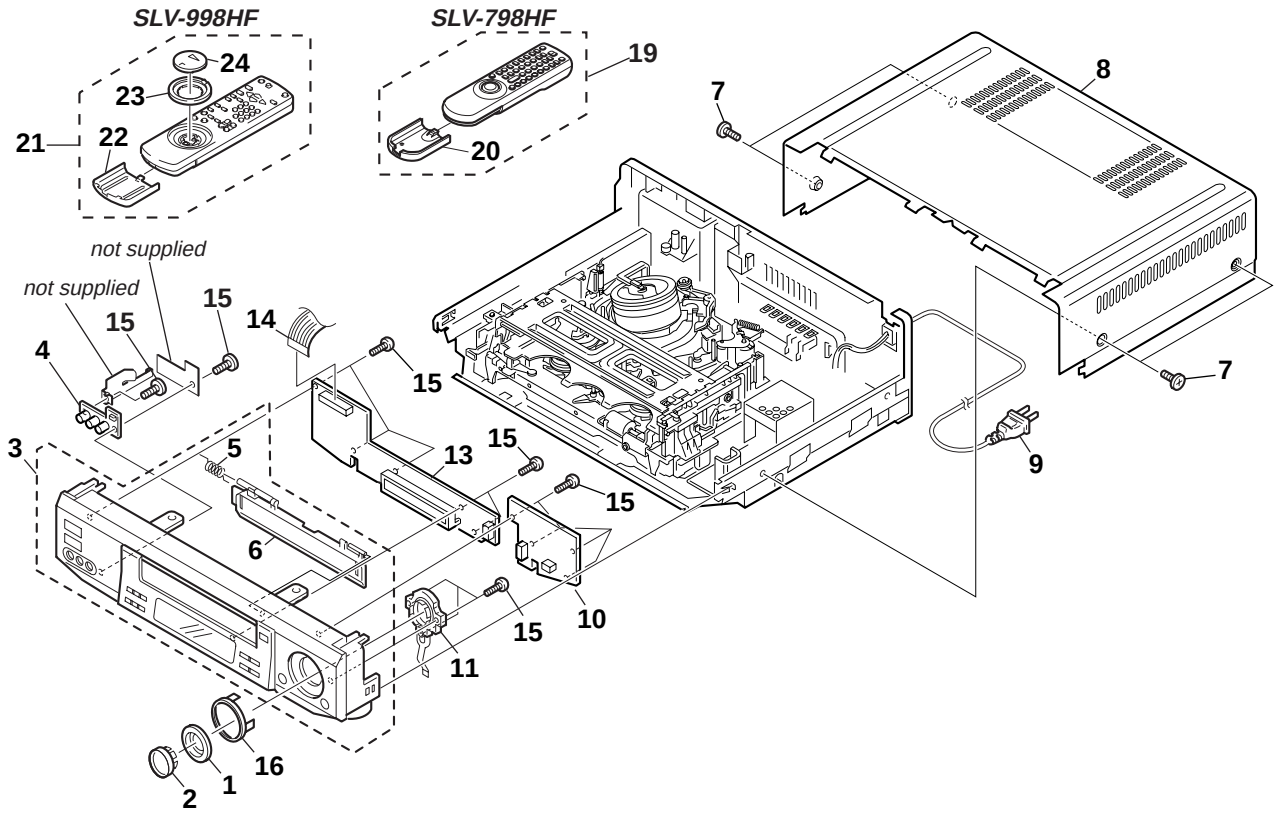
NOTE:

- -XX, -X mean standardized parts, so they may have some differences from the original one.
- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- The mechanical parts with no reference number in the exploded views are not supplied.
- Hardware (#mark) list is given in the last of this parts list.

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety. Replace only with part number specified.

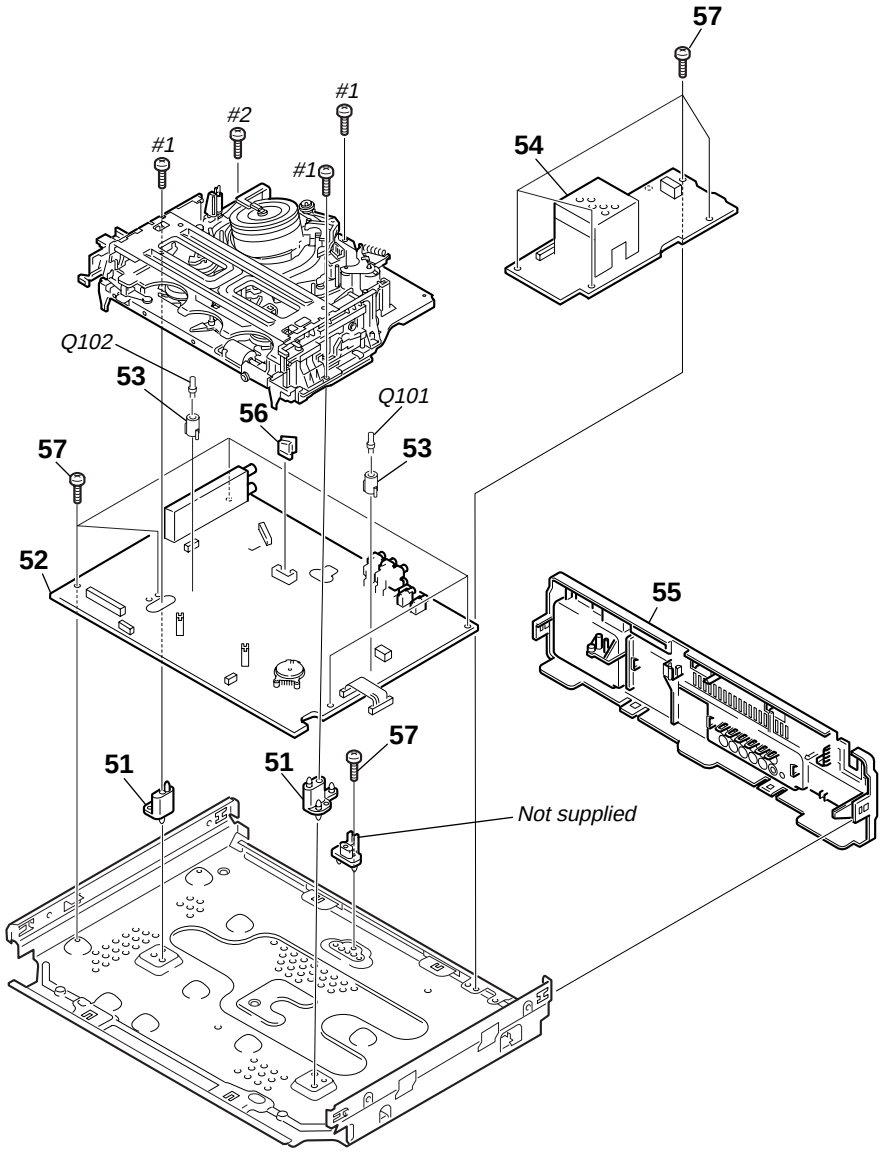
Les composants identifiés par une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

7-1-1. FRONT PANEL ASSEMBLY AND UPPER CASE SECTION



Ref. No.	Part No.	Description	Remarks
1	3-979-310-01	RING (AV), JOG	
2	3-979-309-01	BUTTON (AV), CENTER	
3	X-3947-898-2	PANEL ASSY, FRONT (798HF)	
3	X-3947-899-2	PANEL ASSY, FRONT (998HF)	
* 4	A-6791-466-A	JK-159 BOARD, COMPLETE	
5	3-953-432-01	SPRING (GE), FL	
6	3-979-302-02	DOOR (AV), CASSETTE	
7	3-710-901-11	SCREW, TAPPING	
8	3-979-313-01	CASE, UPPER	
⚠9	1-777-854-21	CORD, POWER	
* 10	A-6791-467-A	DM-74 BOARD, COMPLETE	
11	1-762-844-21	SWITCH, ROTARY	
* 13	A-6791-465-A	FR-130(A) BOARD, COMPLETE (798HF)	
* 13	A-6791-469-A	FR-130(B) BOARD, COMPLETE (998HF)	
14	1-783-131-11	CABLE, FLAT (FFM-16)	
15	4-921-277-41	SCREW (B2.6X8), TAPPING, BIND	
16	4-977-593-21	RING (DIA. 50), ORNAMENTAL (797HF)	
19	1-475-554-41	COMMANDER, STANDARD(RMT-V232C)	(798HF)
20	3-709-129-01	COVER, BATTERY (798HF)	
21	1-475-605-11	COMMANDER, STANDARD (RMT-V229)	(998HF)
22	3-709-126-01	COVER, BATTERY (998HF)	
23	3-973-077-31	RING, CHANGE SPEED (998HF)	
24	3-972-850-01	BUTTON, FUNCTION (998HF)	

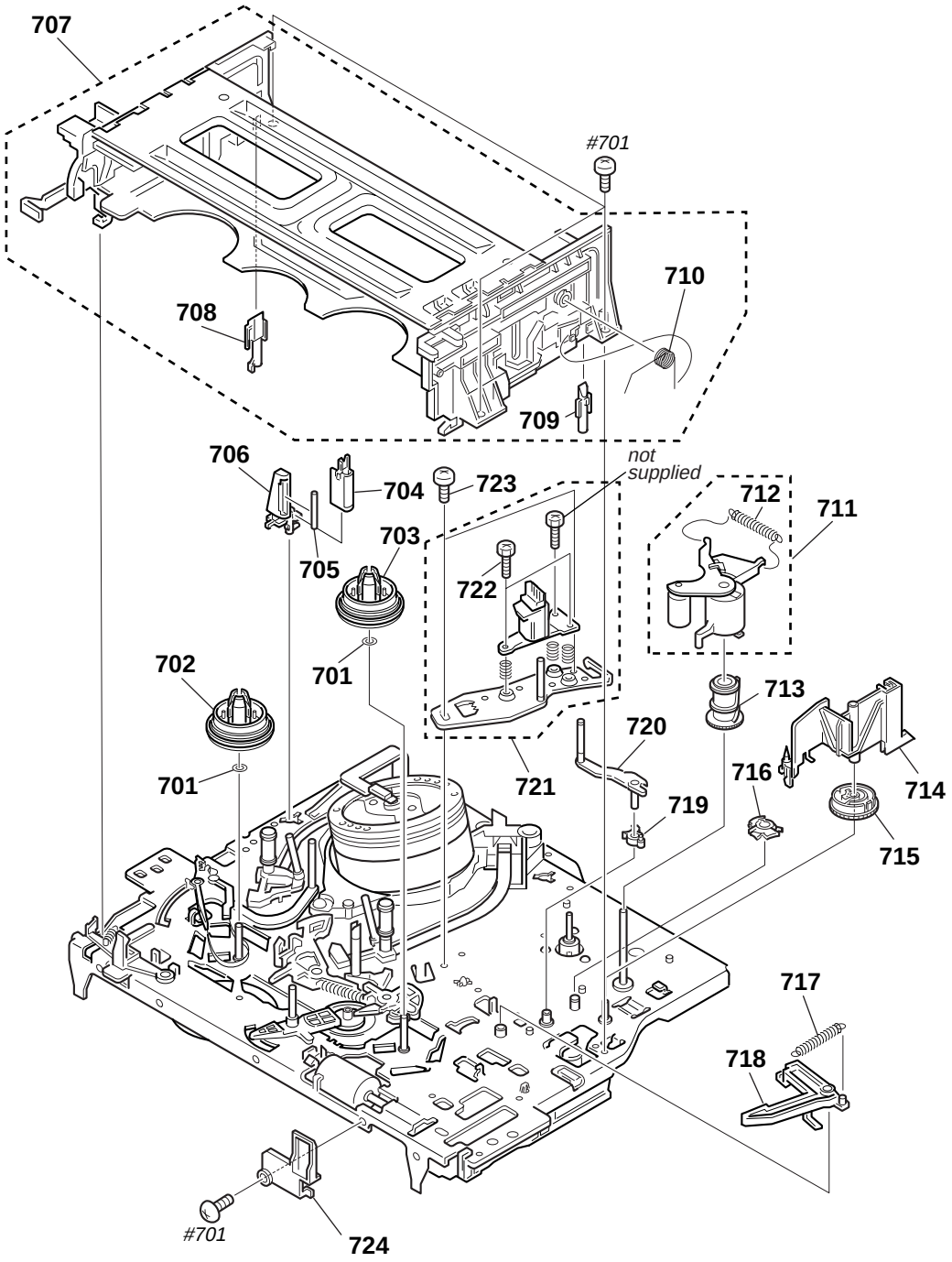
7-1-2. CHASSIS SECTION



Ref. No.	Part No.	Description	Remarks
51	3-979-314-01	BASE (R), MD	
* 52	A-6791-464-A	MA-318(A) BOARD, COMPLETE (798HF)	
* 52	A-6791-468-A	MA-318(B) BOARD, COMPLETE (998HF; US, Canadian, Mexican)	
* 52	A-6791-541-A	MA-318(B) BOARD, COMPLETE (998HF; Chilean, PX)	
53	3-960-273-01	SPACER, TOP END	
⚠54	1-468-281-11	POWER BLOCK SR801 (EXCEPT Chilean, PX)	
⚠54	1-468-282-11	POWER BLOCK SR709 (Chilean, PX)	
* 55	3-979-564-01	PANEL, REAR	
56	1-779-725-11	CONNECTOR, BOARD TO BOARD 5P	
57	3-970-608-21	SUMITITE (B3), +BV	
Q101	8-729-043-84	TRANSISTOR PT380F3	
Q102	8-729-043-84	TRANSISTOR PT380F3	

Note :	**Note :**
The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety. Replace only with part number specified.	Les composants identifiés par une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

7-1-3. MECHANISM DECK-1



Ref. No.	Part No.	Description	Remarks
701	3-977-509-01	WASHER, THRUST	
702	3-977-507-01	TABLE, REEL (S) (GRAY)	
703	3-977-508-01	TABLE, REEL (T) (BLACK)	
704	1-500-144-11	HEAD, FE	
705	3-977-495-01	SHAFT TG2	
706	3-977-494-01	HOLDER, FEH	
707	A-6759-619-C	FL COMPLETE ASSY	
708	3-977-535-01	PLATE, LUMINOUS(END SENSOR)	
709	3-977-536-01	PLATE, LUMINOUS(TOP SENSOR)	
710	3-970-471-01	SPRING (DECK OPEN), TORSION	
711	A-6759-615-A	PRESS BLOCK ASSY, PINCH	
712	3-958-455-01	SPRING (PINCH), TENSION	

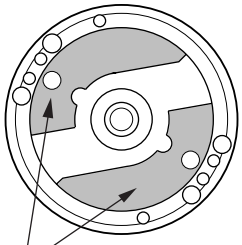
Ref. No.	Part No.	Description	Remarks
713	3-977-447-01	GEAR, ELEVATOR	
714	3-977-514-01	OPENER, LID	
715	3-977-441-01	GEAR, PINCH PRESSING	
716	3-977-445-01	GEAR, TG8 ARM DRIVING	
717	3-977-465-01	SPRING,EXTENSION(RVS BRAKE)	
718	X-3947-582-1	ARM ASSY, RVS BRAKE	
719	3-977-446-01	GEAR, TG8 ARM	
720	X-3947-590-1	TG8 ASSY	
721	A-6759-620-A	HEAD BLOCK ASSY, ACE (TDK)	
722	3-974-556-01	+ HEXA TT 2.6X9 (TAPER)	
723	3-979-508-01	SCREW	
724	3-978-485-01	PLATE, GUIDE CASSETTE	

7-1-4. MECHANISM DECK-2

Note: There are two types of drum assembly in models for service.

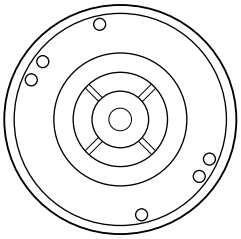
[Discrimination]

No. 768-770
—Top View—



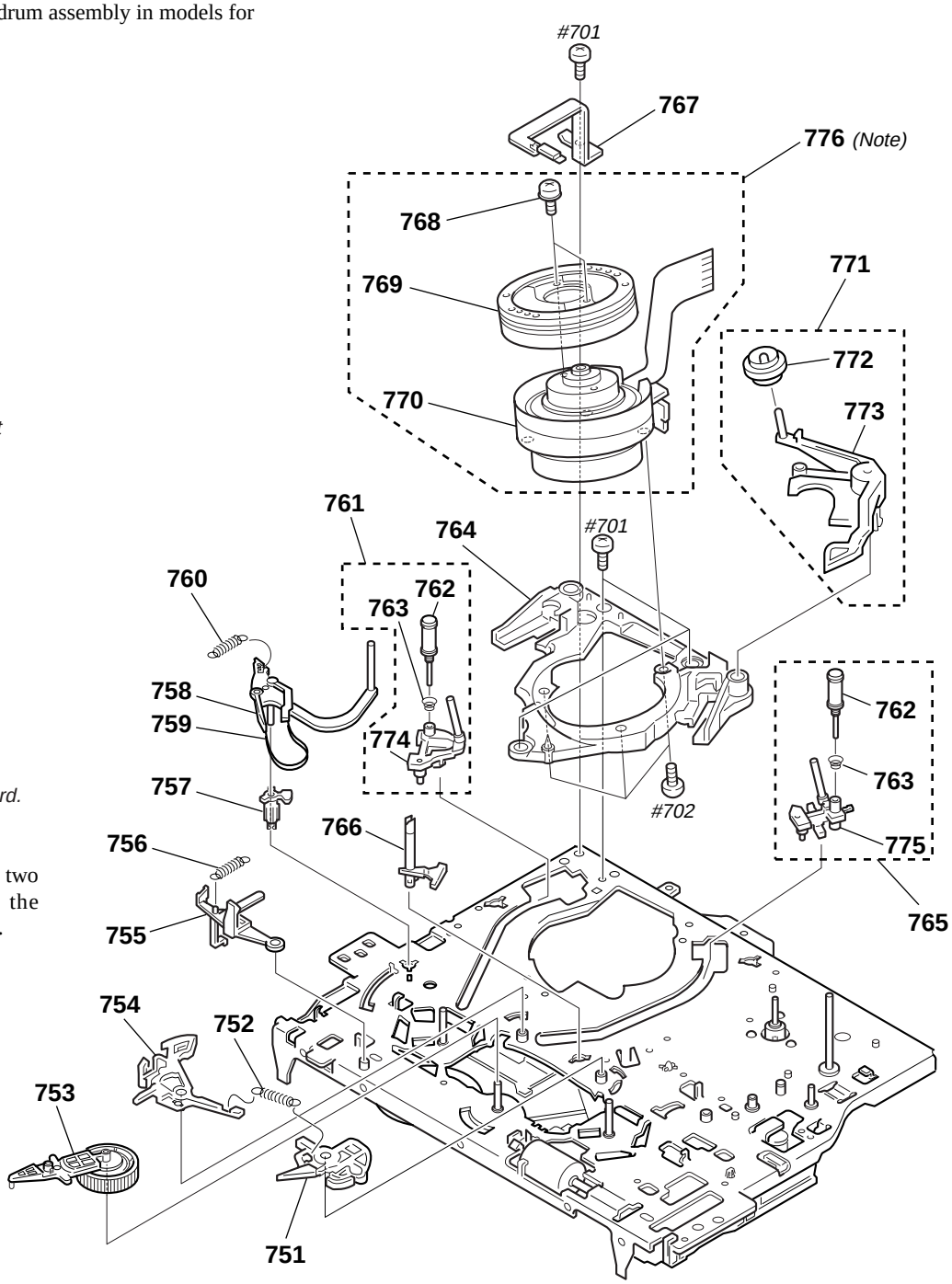
There are two printed circuit boards on the top.

No. 776
—Top View—



There is no printed circuit board.

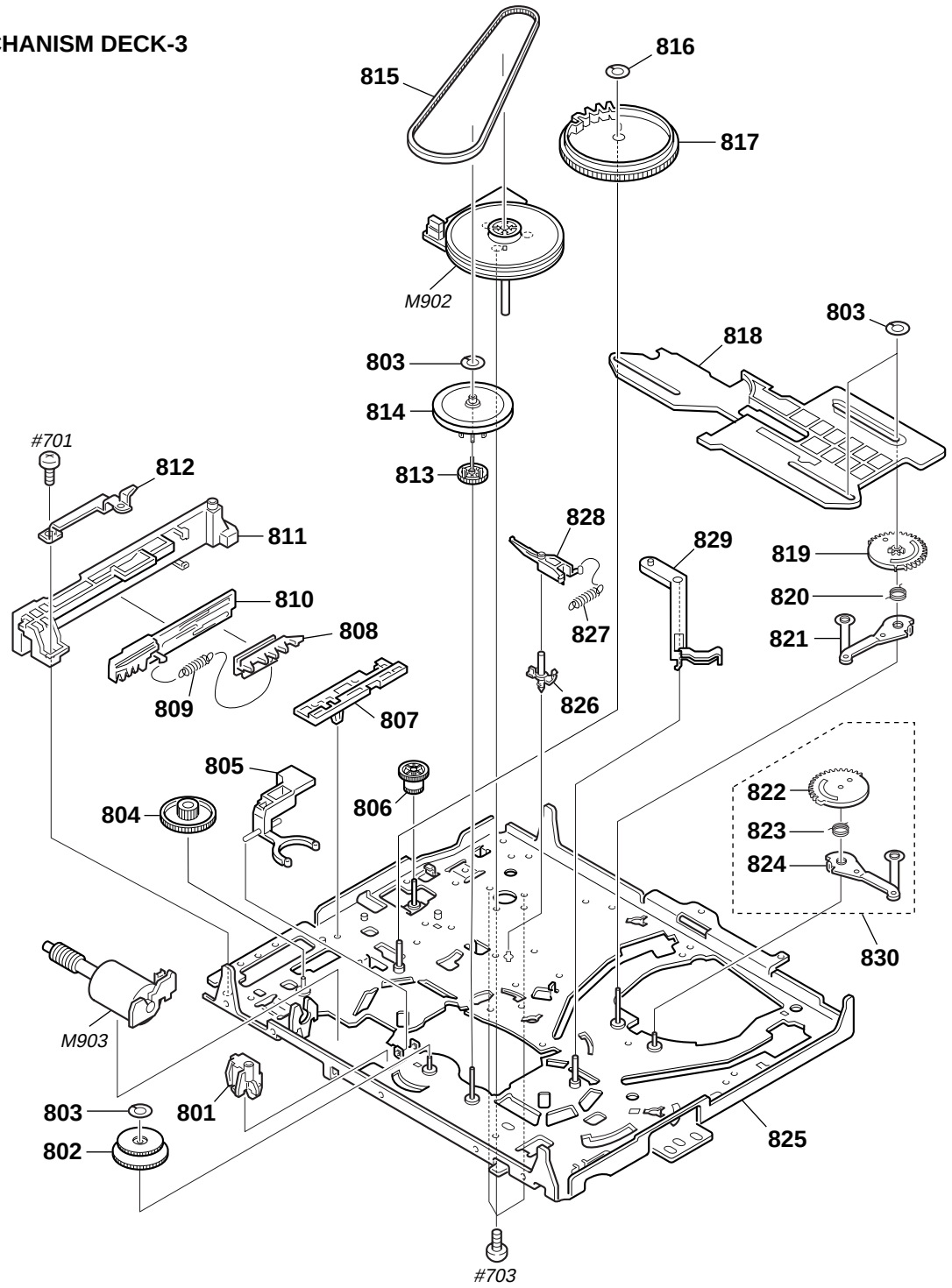
Note: It cannot be divided to two parts, the upper and the lower drum assemblies.



Ref. No.	Part No.	Description	Remarks
751	X-3947-581-1	BRAKE ASSY,MAIN(T)	
752	3-977-462-01	SPRING,EXTENTION. (MAIN BRAKE)	
753	X-3947-573-1	ARM ASSY, PENDULUM	
754	X-3947-580-2	BRAKE ASSY, MAIN(S)	
755	3-977-513-02	LEVER, REC. PROOF	
756	3-976-767-01	SPRING, TENS. (REC. PROOF)	
757	3-977-487-01	BOSS, TG1 FULCRUM	
758	X-3947-587-1	TG1 ASSY	
759	X-3947-589-1	BAND ASSY, TG1	
760	3-977-488-01	SPRING (POWER TENSION)	
761	A-6750-324-A	SHUTTLE (S) BLOCK ASSY	
762	X-3944-378-1	ROLLER ASSY, GUIDE	
763	3-965-178-01	SPRING	
764	3-969-632-04	BASE, DRUM	
765	A-6750-325-A	SHUTTLE (T) BLOCK ASSY	

Ref. No.	Part No.	Description	Remarks
766	3-977-501-01	PLATE, LUMINOUS	
767	X-3943-899-8	GROUND ASSY, SHAFT	
768	2-643-205-01	SCREW	
769	8-848-576-02	DRUM ASSY, UPPER DZR-45-R (EXCEPT 998HF)(Note)	
769	8-848-594-02	DRUM ASSY, UPPER DZR-51-R (998HF)(Note)	
770	8-848-666-11	DRUM ASSY, LOWER DZL-51B/J-RP (M901)	
771	A-6746-074-G	ROLLER BLOCK ASSY, HC	
772	X-3947-255-1	ROLLER ASSY, HC	
773	3-975-724-07	ARM, HC	
774	X-3946-855-1	SHUTTLE (S) ASSY	
775	X-3946-856-1	SHUTTLE (T) ASSY	
776	8-839-044-02	DRUM ASSY DZH-94A/Z-RP (M901) (EXCEPT 998HF)(Note)	
776	8-839-046-02	DRUM ASSY DZH-96A-R (M901)(998HF)(Note)	

7-1-5. MECHANISM DECK-3



Ref. No.	Part No.	Description	Remarks
801	3-977-437-01	RETAINER,CAM MOTOR	
802	X-3947-584-1	ASSY, REEL DIRECT	
803	3-977-443-01	WASHER, STOPPER	
804	3-977-438-01	WORM - WHEEL	
805	3-977-506-01	ARM, LIMITTER SELECTION	
806	3-977-444-01	GEAR, PINCH TRANSMISSION	
807	3-977-515-01	GUIDE, FL SLIDER	
808	3-977-517-01	PLATE, SLIDE, FL	
809	3-977-519-01	SPRING, TENS. (LIMIT, FL)	
810	3-977-518-02	PLATE, LIMITTER, FL	
811	3-977-516-01	HOLDER, FL SLIDER	
812	3-977-877-01	PLATE, RETAINER	
813	3-977-504-01	GEAR, CLUTCH	
814	X-3947-585-1	GEAR ASSY, PULLEY	
815	3-977-510-01	BELT, RUBBER	
816	3-977-440-01	WASHER, STOPPER	

Ref. No.	Part No.	Description	Remarks
817	3-977-439-01	GEAR, CAM	
818	3-977-442-01	SLIDER	
819	3-977-455-01	GEAR, LOADING(T)	
820	3-977-456-03	SPRING, TORSION (LOAD T)	
821	X-3947-579-1	LEVER ASSY, LOADING(T)	
822	3-977-451-01	GEAR, LOADING(S)	
823	3-977-452-01	SPRING, TORSION (LOAD S)	
824	X-3947-578-1	LEVER ASSY, LOADING(S)	
825	X-3947-576-2	CHASSIS ASSY, MECHANICAL	
826	3-977-468-01	SHAFT, CAPSTAN BRAKE	
827	3-977-467-02	SPRING, CAP BRAKE	
828	X-3947-583-1	BRAKE ASSY, CAPSTAN	
829	3-977-489-01	ARM, TG1 DRIVING	
830	A-6759-616-A	GEAR BLOCK ASSY, LOADING	
M902	1-698-971-11	MOTOR, DC	
M903	X-3947-577-1	MOTOR ASSY, CAM	

7-2. ELECTRICAL PARTS LIST

NOTE:

When indicating parts by reference number, please include the board name.

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety. Replace only with part number specified.

Les composants identifiés par une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

- Due to standardization, replacements in the parts list may be different from the parts specified in the diagrams or the components used on the set.
- -XX, -X mean standardized parts, so they may have some difference from the original one.
- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- CAPACITORS:
  uF: µF
- RESISTORS
  All resistors are in ohms.
  METAL: metal-film resistor
  METAL OXIDE: Metal Oxide-film resistor
  F: nonflammable
- COILS
  uH: µH
- SEMICONDUCTORS
  In each case, u: µ, for example:
  uA...: µA... , uPA... , µPA... ,
  uPB... , µPB... , uPC... , µPC... ,
  uPD..., µPD...

Ref. No.	Part No.	Description			Remarks
*	A-6791-467-A	DM-74 BOARD, COMPLETE			
		**********			
		(Ref.No.: 2,000 Series)			
		< CONNECTOR >			
CN440	1-770-031-11	CONNECTOR, BOARD TO BOARD 7P			
CN441	1-770-514-41	CONNECTOR, FFC/FPC 5P			
		< DIODE >			
D440	8-719-056-06	DIODE SLR-342DC3F			
		< TRANSISTOR >			
Q440	8-729-424-08	TRANSISTOR UN2111			
		< RESISTOR >			
R441	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R442	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R443	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R444	1-216-065-91	RES,CHIP	4.7K	5%	1/10W
R445	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R446	1-216-029-00	METAL CHIP	150	5%	1/10W
		< SWITCH >			
S441	1-762-196-21	SWITCH, TACT (EJECT)			
S442	1-762-196-21	SWITCH, TACT (REC)			
S443	1-762-196-21	SWITCH, TACT (JOG)			
S444	1-762-196-21	SWITCH, TACT (PAUSE)			
*	A-6791-465-A	FR-130(A) BOARD, COMPLETE (798HF)			
		**********			
*	A-6791-469-A	FR-130(B) BOARD, COMPLETE (998HF)			
		**********			
		(Ref.No.: 2,000 Series)			
*	3-972-815-01	HOLDER (100), FL			
		< BUZZER >			
BZ460	1-529-104-11	BUZZER, PIEZOELECTRIC			
		< CAPACITOR >			
C460	1-163-809-11	CERAMIC CHIP	0.047uF	10%	25V
C461	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C462	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C463	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C464	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C465	1-126-916-11	ELECT	1000uF	20%	6.3V
C466	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C467	1-126-935-11	ELECT	470uF	20%	6.3V
C468	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C469	1-104-905-11	CAPACITOR	0.22F		5.5V
C471	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C472	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C473	1-163-235-11	CERAMIC CHIP	22PF	5%	50V
C474	1-163-102-00	CERAMIC CHIP	24PF	5%	50V
C475	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C476	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C477	1-163-229-11	CERAMIC CHIP	12PF	5%	50V
C478	1-163-229-11	CERAMIC CHIP	12PF	5%	50V
C479	1-126-096-11	ELECT	10uF	20%	35V
		< CONNECTOR >			
CN460	1-695-392-31	PIN, CONNECTOR (PC BOARD) 31P			
* CN461	1-691-406-11	CONNECTOR, BOARD TO BOARD 7P			
		< DIODE >			
D420	8-719-110-03	DIODE RD7.5ES-B2			
D460	8-719-056-07	DIODE SLR-342MCT31			
D462	8-719-200-82	DIODE 11ES2			
D463	8-719-200-82	DIODE 11ES2			
		< IC >			
IC460	8-752-891-14	IC CXP82960-057Q			
IC461	8-749-011-22	IC GP1U27X			
IC462	8-759-432-34	IC ST24W16FM6TR			
IC463	8-759-248-87	IC MM1256XF-BE			
		< JUMPER RESISTOR >			
JR401	1-216-296-00	METAL CHIP	0	5%	1/8W
JR402	1-216-295-00	METAL CHIP	0	5%	1/10W
JR403	1-216-296-00	METAL CHIP	0	5%	1/8W
JR404	1-216-295-00	METAL CHIP	0	5%	1/10W
JR405	1-216-295-00	METAL CHIP	0	5%	1/10W
JR406	1-216-295-00	METAL CHIP	0	5%	1/10W
JR407	1-216-295-00	METAL CHIP	0	5%	1/10W
JR408	1-216-296-00	METAL CHIP	0	5%	1/8W
		< COIL >			
L181	1-410-509-11	INDUCTOR 10uH			
		< FLUORESCENT INDICATOR >			
ND420	1-517-716-11	INDICATOR TUBE, FLUORESCENT			

Ref. No.	Part No.	Description			Remarks
		< TRANSISTOR >			
Q460	8-729-421-22	TRANSISTOR UN2211			
		< RESISTOR >			
R404	1-216-089-00	METAL CHIP	47K	5%	1/10W
R405	1-216-075-00	METAL CHIP	12K	5%	1/10W
R406	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R407	1-216-057-00	METAL CHIP	2.2K	5%	1/10W (998HF)
R407	1-216-073-00	METAL CHIP	10K	5%	1/10W (797HF,798HF)
R408	1-216-061-00	METAL CHIP	3.3K	5%	1/10W (998HF)
R409	1-216-065-91	RES,CHIP	4.7K	5%	1/10W (998HF)
R410	1-216-075-00	METAL CHIP	12K	5%	1/10W
R411	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R412	1-216-073-00	METAL CHIP	10K	5%	1/10W
R413	1-216-073-00	METAL CHIP	10K	5%	1/10W
R415	1-216-073-00	METAL CHIP	10K	5%	1/10W
R416	1-216-073-00	METAL CHIP	10K	5%	1/10W
R417	1-216-073-00	METAL CHIP	10K	5%	1/10W
R420	1-216-069-00	METAL CHIP	6.8K	5%	1/10W
R460	1-216-029-00	METAL CHIP	150	5%	1/10W
R461	1-216-089-00	METAL CHIP	47K	5%	1/10W
R462	1-216-049-00	METAL CHIP	1K	5%	1/10W
R463	1-216-089-00	METAL CHIP	47K	5%	1/10W
R464	1-216-049-00	METAL CHIP	1K	5%	1/10W
R465	1-216-049-00	METAL CHIP	1K	5%	1/10W
R466	1-216-073-00	METAL CHIP	10K	5%	1/10W
R467	1-216-073-00	METAL CHIP	10K	5%	1/10W
R468	1-216-113-00	METAL CHIP	470K	5%	1/10W
R469	1-216-073-00	METAL CHIP	10K	5%	1/10W
R470	1-216-073-00	METAL CHIP	10K	5%	1/10W
R471	1-216-025-91	RES,CHIP	100	5%	1/10W
R472	1-216-025-91	RES,CHIP	100	5%	1/10W
R474	1-216-113-00	METAL CHIP	470K	5%	1/10W
R475	1-216-295-00	METAL CHIP	0	5%	1/10W
R476	1-216-295-00	METAL CHIP	0	5%	1/10W
R477	1-216-095-00	METAL CHIP	82K	5%	1/10W
R478	1-216-113-00	METAL CHIP	470K	5%	1/10W
R479	1-216-049-00	METAL CHIP	1K	5%	1/10W
R480	1-216-049-00	METAL CHIP	1K	5%	1/10W
R481	1-216-049-00	METAL CHIP	1K	5%	1/10W
R482	1-216-049-00	METAL CHIP	1K	5%	1/10W
R483	1-216-073-00	METAL CHIP	10K	5%	1/10W
R484	1-216-073-00	METAL CHIP	10K	5%	1/10W
R485	1-216-113-00	METAL CHIP	470K	5%	1/10W
		< SWITCH >			
S402	1-762-196-21	SWITCH, TACT (POWER)			
S403	1-762-196-21	SWITCH, TACT (EDIT)			
S404	1-762-196-21	SWITCH, TACT (SP/EP)			
S405	1-762-196-21	SWITCH, TACT (TV/VIDEO)			
S406	1-762-196-21	SWITCH, TACT (INPUT SELECT)			
S407	1-762-196-21	SWITCH, TACT (COMMAND MODE)(998HF)			
S408	1-762-196-21	SWITCH, TACT (EASY SET UP) (998HF)			
S409	1-762-196-21	SWITCH, TACT (CHANNEL:-)			
S410	1-762-196-21	SWITCH, TACT (CHANNEL:+)			
S411	1-762-196-21	SWITCH, TACT (REW)			
S412	1-762-196-21	SWITCH, TACT (FF)			
		< VIBRATOR >			
X460	1-760-494-11	VIBRATOR, CRYSTAL 16MHz			
X461	1-579-463-11	VIBRATOR, CRYSTAL 32.768kHz			
*	A-6791-466-A	JK-159 BOARD, COMPLETE ********** (Ref.No.: 2,000 Series)			
		< CAPACITOR >			
C806	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
		< JACK >			
CJ801	1-774-509-11	JACK, PIN 3P (VIDEO,AUDIO LINE-2 IN)			
		< CONNECTOR >			
CN801	1-506-484-11	PIN, CONNECTOR 5P			
		< DIODE >			
D801	8-719-108-12	DIODE RD9.1E-W			
D802	8-719-108-12	DIODE RD9.1E-W			
D803	8-719-109-84	DIODE RD5.1ES-B1			
D804	8-719-108-12	DIODE RD9.1E-W			
		< RESISTOR >			
R801	1-216-295-00	METAL CHIP	0	5%	1/10W
R802	1-216-295-00	METAL CHIP	0	5%	1/10W
R803	1-216-022-00	METAL CHIP	75	5%	1/10W
*	A-6791-464-A	MA-318(A) BOARD, COMPLETE (798HF) **********			
*	A-6791-468-A	MA-318(B) BOARD, COMPLETE ********** (998HF: US, Canadian, Mexican)			
*	A-6791-541-A	MA-318(B) BOARD, COMPLETE ********** (998HF: Chilean, PX) (Ref.No.: 1,000 Series)			
*	3-960-273-01	SPACER, TOP END			
*	3-960-274-01	SPACER, LED			
		< CAPACITOR >			
C101	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
C102	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
C103	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
C104	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
C105	1-128-057-11	ELECT	330uF	20%	6.3V
C106	1-124-589-11	ELECT	47uF	20%	16V
C108	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C109	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C118	1-137-441-11	FILM	0.027uF	5%	50V
C119	1-126-157-11	ELECT	10uF	20%	16V

MA-318

Ref. No.	Part No.	Description			Remarks
C120	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C121	1-124-463-00	ELECT	0.1uF	20%	50V
C122	1-126-154-11	ELECT	47uF	20%	6.3V
C123	1-130-489-00	MYLAR	0.033uF	5%	50V
C140	1-126-933-11	ELECT	100uF	20%	16V
C142	1-126-933-11	ELECT	100uF	20%	16V
C143	1-109-982-11	CERAMIC CHIP	1uF	10%	10V
C144	1-163-018-00	CERAMIC CHIP	0.0056uF	5%	50V
C145	1-126-967-11	ELECT	47uF	20%	16V
C146	1-163-263-11	CERAMIC CHIP	330PF	5%	50V
C147	1-109-982-11	CERAMIC CHIP	1uF	10%	10V
C149	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C150	1-126-967-11	ELECT	47uF	20%	16V
C151	1-163-121-00	CERAMIC CHIP	150PF	5%	50V
C152	1-164-161-11	CERAMIC CHIP	0.0022uF	10%	100V
C153	1-164-161-11	CERAMIC CHIP	0.0022uF	10%	100V
C160	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C161	1-163-229-11	CERAMIC CHIP	12PF	5%	50V
C162	1-163-229-11	CERAMIC CHIP	12PF	5%	50V
C163	1-126-154-11	ELECT	47uF	20%	6.3V
C164	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C165	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C166	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C172	1-124-584-00	ELECT	100uF	20%	10V
C201	1-109-982-11	CERAMIC CHIP	1uF	10%	10V
C202	1-163-809-11	CERAMIC CHIP	0.047uF	10%	25V
C204	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C205	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C206	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C207	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C209	1-124-248-00	ELECT	22uF	20%	35V
C210	1-163-131-00	CERAMIC CHIP	390PF	5%	50V
C214	1-163-124-00	CERAMIC CHIP	200PF	5%	50V
C217	1-109-982-11	CERAMIC CHIP	1uF	10%	10V
C219	1-164-159-21	CERAMIC	0.1uF		50V
C220	1-109-982-11	CERAMIC CHIP	1uF	10%	10V
C222	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C223	1-124-589-11	ELECT	47uF	20%	16V
C226	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C228	1-124-261-00	ELECT	10uF	20%	50V
C229	1-164-159-21	CERAMIC	0.1uF		50V
C230	1-124-589-11	ELECT	47uF	20%	16V
C231	1-124-261-00	ELECT	10uF	20%	50V
C232	1-109-982-11	CERAMIC CHIP	1uF	10%	10V
C233	1-109-982-11	CERAMIC CHIP	1uF	10%	10V
C234	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C235	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C236	1-109-982-11	CERAMIC CHIP	1uF	10%	10V
C237	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C238	1-164-159-21	CERAMIC	0.1uF		50V
C240	1-109-982-11	CERAMIC CHIP	1uF	10%	10V
C241	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C242	1-109-982-11	CERAMIC CHIP	1uF	10%	10V
C243	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C245	1-163-809-11	CERAMIC CHIP	0.047uF	10%	25V
C246	1-109-982-11	CERAMIC CHIP	1uF	10%	10V
C247	1-163-809-11	CERAMIC CHIP	0.047uF	10%	25V
C248	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C250	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C251	1-163-038-00	CERAMIC CHIP	0.1uF		25V

Ref. No.	Part No.	Description			Remarks
C252	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C253	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C254	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C255	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C256	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C260	1-163-229-11	CERAMIC CHIP	12PF	5%	50V
C261	1-163-229-11	CERAMIC CHIP	12PF	5%	50V
C262	1-163-099-00	CERAMIC CHIP	18PF	5%	50V (998HF)
C263	1-163-099-00	CERAMIC CHIP	18PF	5%	50V (998HF)
C264	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C265	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C266	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C267	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C268	1-163-235-11	CERAMIC CHIP	22PF	5%	50V
C269	1-163-235-11	CERAMIC CHIP	22PF	5%	50V
C270	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C271	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C272	1-163-099-00	CERAMIC CHIP	18PF	5%	50V
C273	1-163-099-00	CERAMIC CHIP	18PF	5%	50V
C274	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C276	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C277	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C278	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C279	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C280	1-124-584-00	ELECT	100uF	20%	10V
C281	1-164-346-11	CERAMIC CHIP	1uF		16V
C282	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C283	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C284	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C285	1-162-306-11	CERAMIC	0.01uF	30%	16V
C286	1-124-584-00	ELECT	100uF	20%	10V
C287	1-163-227-11	CERAMIC CHIP	10PF	0.5PF	50V
C288	1-163-227-11	CERAMIC CHIP	10PF	0.5PF	50V
C289	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C301	1-164-159-21	CERAMIC	0.1uF		50V
C305	1-126-160-11	ELECT	1uF	20%	50V
C306	1-126-160-11	ELECT	1uF	20%	50V
C307	1-126-964-11	ELECT	10uF	20%	50V
C308	1-126-967-11	ELECT	47uF	20%	16V
C309	1-126-963-11	ELECT	4.7uF	20%	50V
C310	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
C311	1-163-014-00	CERAMIC CHIP	0.0027uF	10%	50V
C312	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C313	1-124-261-00	ELECT	10uF	20%	50V
C314	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C315	1-126-160-11	ELECT	1uF	20%	50V
C317	1-126-163-11	ELECT	4.7uF	20%	50V
C318	1-126-967-11	ELECT	47uF	20%	16V
C331	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C332	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C333	1-124-589-11	ELECT	47uF	20%	16V
C334	1-137-374-11	FILM	0.047uF	5%	50V (798HF)
C334	1-137-462-11	FILM	0.018uF	5%	100V (998HF)
C340	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C341	1-124-589-11	ELECT	47uF	20%	16V
C342	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V

Ref. No.	Part No.	Description			Remarks
C346	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C350	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C352	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
C353	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C357	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
C358	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C359	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C361	1-164-222-11	CERAMIC CHIP	0.22uF		25V
C362	1-164-222-11	CERAMIC CHIP	0.22uF		25V
C363	1-126-960-11	ELECT	1uF	20%	50V
C364	1-126-960-11	ELECT	1uF	20%	50V
C365	1-126-960-11	ELECT	1uF	20%	50V
C366	1-126-960-11	ELECT	1uF	20%	50V
C369	1-126-964-11	ELECT	10uF	20%	50V
C370	1-126-964-11	ELECT	10uF	20%	50V
C371	1-126-964-11	ELECT	10uF	20%	50V
C372	1-126-964-11	ELECT	10uF	20%	50V
C373	1-126-964-11	ELECT	10uF	20%	50V
C374	1-126-960-11	ELECT	1uF	20%	50V
C375	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C377	1-126-967-11	ELECT	47uF	20%	16V
C378	1-126-964-11	ELECT	10uF	20%	50V
C379	1-126-961-11	ELECT	2.2uF	20%	50V
C380	1-126-964-11	ELECT	10uF	20%	50V
C381	1-126-967-11	ELECT	47uF	20%	16V
C383	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C384	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C385	1-126-967-11	ELECT	47uF	20%	16V
C386	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C391	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C398	1-163-016-00	CERAMIC CHIP	0.0039uF	10%	50V
C399	1-163-016-00	CERAMIC CHIP	0.0039uF	10%	50V
C501	1-164-489-11	CERAMIC CHIP	0.22uF	10%	16V
C502	1-124-589-11	ELECT	47uF	20%	16V
C503	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C504	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C505	1-126-157-11	ELECT	10uF	20%	16V
C506	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C507	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C508	1-163-239-11	CERAMIC CHIP	33PF	5%	50V
C509	1-164-505-11	CERAMIC CHIP	2.2uF		16V
C511	1-163-229-11	CERAMIC CHIP	12PF	5%	50V
C512	1-163-235-11	CERAMIC CHIP	22PF	5%	50V
C513	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C514	1-163-235-11	CERAMIC CHIP	22PF	5%	50V
C515	1-124-589-11	ELECT	47uF	20%	16V
C516	1-126-160-11	ELECT	1uF	20%	50V
C517	1-163-239-11	CERAMIC CHIP	33PF	5%	50V
C518	1-124-257-00	ELECT	2.2uF	20%	50V
C519	1-163-139-00	CERAMIC CHIP	820PF	5%	50V
C520	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C521	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C522	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C523	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C560	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
C561	1-126-935-11	ELECT	470uF	20%	6.3V
C563	1-124-589-11	ELECT	47uF	20%	16V
C564	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C621	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C622	1-126-965-11	ELECT	22uF	20%	50V
C623	1-126-967-11	ELECT	47uF	20%	16V
C624	1-124-589-11	ELECT	47uF	20%	16V
C625	1-126-967-11	ELECT	47uF	20%	16V
C626	1-128-131-11	ELECT	22uF	20%	50V
C627	1-128-131-11	ELECT	22uF	20%	50V
C628	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C629	1-126-966-11	ELECT	33uF	20%	16V
C701	1-126-967-11	ELECT	47uF	20%	16V
C704	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C706	1-126-963-11	ELECT	4.7uF	20%	50V
C707	1-164-161-11	CERAMIC CHIP	0.0022uF	10%	100V
C709	1-126-933-11	ELECT	100uF	20%	16V
C710	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C712	1-126-933-11	ELECT	100uF	20%	16V
C735	1-126-964-11	ELECT	10uF	20%	50V
C736	1-126-967-11	ELECT	47uF	20%	16V
C802	1-163-263-11	CERAMIC CHIP	330PF	5%	50V
C803	1-163-243-11	CERAMIC CHIP	47PF	5%	50V
C804	1-163-091-00	CERAMIC CHIP	8PF		50V
C805	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C806	1-163-087-00	CERAMIC CHIP	4PF		50V
C807	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C808	1-163-127-00	CERAMIC CHIP	270PF	5%	50V
C809	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C810	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C811	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C812	1-163-237-11	CERAMIC CHIP	27PF	5%	50V
C813	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C814	1-163-257-11	CERAMIC CHIP	180PF	5%	50V
C815	1-124-589-11	ELECT	47uF	20%	16V
C816	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C817	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C830	1-164-232-11	CERAMIC CHIP	0.01uF		50V (998HF)
C832	1-163-251-11	CERAMIC CHIP	100PF	5%	50V (998HF)
C833	1-163-121-00	CERAMIC CHIP	150PF	5%	50V (998HF)
C834	1-163-245-11	CERAMIC CHIP	56PF	5%	50V (998HF)
C835	1-163-038-00	CERAMIC CHIP	0.1uF		25V (998HF)
C836	1-124-589-11	ELECT	47uF	20%	16V (998HF)
C837	1-163-038-00	CERAMIC CHIP	0.1uF		25V (998HF)
C851	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C852	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C853	1-163-243-11	CERAMIC CHIP	47PF	5%	50V
C854	1-163-239-11	CERAMIC CHIP	33PF	5%	50V
C855	1-163-243-11	CERAMIC CHIP	47PF	5%	50V
C859	1-124-589-11	ELECT	47uF	20%	16V
C871	1-124-589-11	ELECT	47uF	20%	16V
C872	1-163-019-00	CERAMIC CHIP	0.0068uF	10%	50V
C873	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C874	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C875	1-164-346-11	CERAMIC CHIP	1uF		16V
C876	1-163-135-00	CERAMIC CHIP	560PF	5%	50V
C878	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C880	1-163-099-00	CERAMIC CHIP	18PF	5%	50V

Ref. No.	Part No.	Description			Remarks
C881	1-163-099-00	CERAMIC CHIP	18PF	5%	50V
C913	1-163-011-11	CERAMIC CHIP	0.0015uF	10%	50V (998HF)
C932	1-164-232-11	CERAMIC CHIP	0.01uF		50V (998HF)
C933	1-126-967-11	ELECT	47uF	20%	16V (998HF)
C934	1-104-697-11	FILM	0.047uF	5%	100V (998HF)
C935	1-163-251-11	CERAMIC CHIP	100PF	5%	50V (998HF)
C980	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C981	1-126-967-11	ELECT	47uF	20%	16V
C982	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C983	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C984	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
C985	1-163-017-00	CERAMIC CHIP	0.0047uF	5%	50V
C986	1-163-038-00	CERAMIC CHIP	0.1uF		25V
		< JACK >			
CJ570	1-779-011-11	JACK, PIN 6P (VIDEO,AUDIO LINE-1 IN/LINE OUT)			
		< CONNECTOR >			
CN101	1-779-724-11	CONNECTOR, BOARD TO BOARD 5P			
CN102	1-779-723-11	CONNECTOR, BOARD TO BOARD 9P			
* CN103	1-766-716-11	CONNECTOR, BOARD TO BOARD 3P			
CN162	1-568-845-11	PIN, CONNECTOR (PC BOARD) 31P			
CN163	1-506-469-11	PIN, CONNECTOR 4P			
CN260	1-766-986-11	CONNECTOR, FFC/FPC 13P			
* CN261	1-560-892-00	PIN, CONNECTOR 4P			
CN301	1-506-471-11	PIN, CONNECTOR 6P			
CN302	1-506-468-11	PIN, CONNECTOR 3P (798HF)			
* CN341	1-560-891-00	PIN, CONNECTOR 3P			
CN423	1-506-470-11	PIN, CONNECTOR 5P			
* CN602	1-568-938-11	PIN, CONNECTOR 11P (998HF: Chilean, PX)			
CN603	1-569-337-11	CONNECTOR, BOARD TO BOARD 11P (EXCEPT 998HF: Chilean, PX)			
CN931	1-506-468-11	PIN, CONNECTOR 3P (998HF)			
		< JACK >			
CNJ980	1-779-013-11	JACK, MINIATURE (CONTROL S IN)			
CNJ981	1-784-598-11	JACK (CONTROL S OUT)			
		< DIODE >			
D103	8-719-048-26	DIODE GL528V1			
D107	8-719-911-19	DIODE 1SS119			
D109	8-719-200-82	DIODE 11ES2			
D161	8-719-200-82	DIODE 11ES2			
D370	8-719-110-08	DIODE RD8.2ES-B2			
D379	8-719-911-19	DIODE 1SS119			
D502	8-719-911-19	DIODE 1SS119			
D503	8-719-911-19	DIODE 1SS119			
D504	8-719-911-19	DIODE 1SS119			
D560	8-719-109-74	DIODE RD4.3ES-B1			
D561	8-719-109-74	DIODE RD4.3ES-B1			
D611	8-719-911-19	DIODE 1SS119			
D612	8-719-109-85	DIODE RD5.1ES-B2			
D614	8-719-911-19	DIODE 1SS119			
D702	8-719-150-92	DIODE RD33ES-T1B			

Ref. No.	Part No.	Description	Remarks
D801	8-719-971-05	DIODE HSM123	
D802	8-719-911-19	DIODE 1SS119	
D980	8-719-110-08	DIODE RD8.2ES-B2	
D981	8-719-110-08	DIODE RD8.2ES-B2	
D982	8-719-911-19	DIODE 1SS119	
D983	8-719-110-08	DIODE RD8.2ES-B2	
D984	8-719-110-08	DIODE RD8.2ES-B2	
		< IC >	
IC100	8-759-702-02	IC NJM062M	
IC101	8-759-481-46	IC LB1943	
IC140	8-759-100-93	IC uPC393G2	
IC141	8-759-438-83	IC BA6305F-E2	
IC161	8-752-891-10	IC CXP87948-006Q	
IC201	8-759-488-74	IC LA71534M-MPB	
IC202	8-759-439-51	IC LC89978M-TE-L	
IC260	8-759-352-17	IC HA118195NT	
IC301	8-759-499-30	IC BA7755AF-E2	
IC340	8-759-486-92	IC LA7256	
IC360	8-759-486-64	IC TDA9615H/N1,557	
IC500	8-759-443-82	IC MB90089PF-G-178-ER-JK	
IC501	8-759-164-09	IC LA7218M-TE-R	
IC601	8-759-438-18	IC PQ12RD08	
IC733	8-742-037-00	HY B IC SBX1837-51	
IC871	8-759-430-84	IC MC68HC05CCVFB-LSC86145FB	
IC980	8-759-356-27	IC NJM2129M-TE2	
		< JUMPER RESISTOR >	
JR001	1-216-295-00	METAL CHIP 0 5% 1/10W	
JR002	1-216-296-00	METAL CHIP 0 5% 1/8W	
JR004	1-216-295-00	METAL CHIP 0 5% 1/10W	
JR005	1-216-296-00	METAL CHIP 0 5% 1/8W	
JR006	1-216-296-00	METAL CHIP 0 5% 1/8W	
JR007	1-216-296-00	METAL CHIP 0 5% 1/8W	
JR008	1-216-296-00	METAL CHIP 0 5% 1/8W	
JR009	1-216-296-00	METAL CHIP 0 5% 1/8W	
JR010	1-216-296-00	METAL CHIP 0 5% 1/8W	
JR011	1-216-296-00	METAL CHIP 0 5% 1/8W	
JR012	1-216-296-00	METAL CHIP 0 5% 1/8W	
JR013	1-216-295-00	METAL CHIP 0 5% 1/10W	
JR014	1-216-296-00	METAL CHIP 0 5% 1/8W	
JR015	1-216-296-00	METAL CHIP 0 5% 1/8W	
JR016	1-216-295-00	METAL CHIP 0 5% 1/10W	
JR017	1-216-296-00	METAL CHIP 0 5% 1/8W	
JR018	1-216-296-00	METAL CHIP 0 5% 1/8W	
JR019	1-216-295-00	METAL CHIP 0 5% 1/10W	
JR020	1-216-296-00	METAL CHIP 0 5% 1/8W	
JR021	1-216-295-00	METAL CHIP 0 5% 1/10W	
JR022	1-216-296-00	METAL CHIP 0 5% 1/8W	
JR023	1-216-296-00	METAL CHIP 0 5% 1/8W	
JR024	1-216-296-00	METAL CHIP 0 5% 1/8W	
JR025	1-216-295-00	METAL CHIP 0 5% 1/10W	
JR026	1-216-295-00	METAL CHIP 0 5% 1/10W	
JR027	1-216-295-00	METAL CHIP 0 5% 1/10W	
JR028	1-216-295-00	METAL CHIP 0 5% 1/10W	
JR029	1-216-295-00	METAL CHIP 0 5% 1/10W	
JR030	1-216-296-00	METAL CHIP 0 5% 1/8W	
JR031	1-216-296-00	METAL CHIP 0 5% 1/8W	

Ref. No.	Part No.	Description			Remarks
JR032	1-216-296-00	METAL CHIP	0	5%	1/8W
JR033	1-216-295-00	METAL CHIP	0	5%	1/10W
JR034	1-216-296-00	METAL CHIP	0	5%	1/8W
JR035	1-216-295-00	METAL CHIP	0	5%	1/10W
JR036	1-216-296-00	METAL CHIP	0	5%	1/8W
JR037	1-216-296-00	METAL CHIP	0	5%	1/8W
JR038	1-216-295-00	METAL CHIP	0	5%	1/10W
JR039	1-216-296-00	METAL CHIP	0	5%	1/8W
JR040	1-216-296-00	METAL CHIP	0	5%	1/8W
JR041	1-216-296-00	METAL CHIP	0	5%	1/8W
JR043	1-216-296-00	METAL CHIP	0	5%	1/8W
JR044	1-216-296-00	METAL CHIP	0	5%	1/8W
JR045	1-216-296-00	METAL CHIP	0	5%	1/8W
JR046	1-216-295-00	METAL CHIP	0	5%	1/10W
JR047	1-216-296-00	METAL CHIP	0	5%	1/8W
JR048	1-216-296-00	METAL CHIP	0	5%	1/8W
JR049	1-216-296-00	METAL CHIP	0	5%	1/8W
JR050	1-216-295-00	METAL CHIP	0	5%	1/10W
		< JUMPER RESISTOR >			
JS609	1-216-295-00	METAL CHIP	0	5%	1/10W
		< COIL >			
L101	1-414-936-21	INDUCTOR	22uH		
L140	1-414-189-31	INDUCTOR	100uH		
L141	1-414-189-31	INDUCTOR	100uH		
L160	1-414-934-21	INDUCTOR	10uH		
L204	1-414-940-21	INDUCTOR	100uH		
L260	1-414-934-21	INDUCTOR	10uH (998HF)		
L262	1-414-940-21	INDUCTOR	100uH		
L263	1-414-940-21	INDUCTOR	100uH		
L264	1-414-934-21	INDUCTOR	10uH (998HF)		
L331	1-414-940-21	INDUCTOR	100uH		
L341	1-414-940-21	INDUCTOR	100uH		
L501	1-414-936-21	INDUCTOR	22uH		
L502	1-414-940-21	INDUCTOR	100uH		
L503	1-414-940-21	INDUCTOR	100uH		
L560	1-414-940-21	INDUCTOR	100uH		
L604	1-410-519-11	INDUCTOR	68uH		
L605	1-414-930-21	INDUCTOR	2.2uH		
L606	1-414-934-21	INDUCTOR	10uH		
L607	1-414-930-21	INDUCTOR	2.2uH		
L703	1-414-930-21	INDUCTOR	2.2uH		
L704	1-414-938-21	INDUCTOR	47uH		
L731	1-414-938-21	INDUCTOR	47uH		
L801	1-410-524-41	INDUCTOR	180uH		
L803	1-414-946-21	INDUCTOR	39uH		
L804	1-414-946-21	INDUCTOR	39uH		
L805	1-414-939-21	INDUCTOR	68uH		
L830	1-414-933-11	INDUCTOR	6.8uH (998HF)		
L831	1-414-940-21	INDUCTOR	100uH (998HF)		
L871	1-414-934-21	INDUCTOR	10uH		
L931	1-410-687-11	INDUCTOR	1.2mH (998HF)		
		< PHOTO INTERRUPTER >			
PH101	8-749-013-23	PHOTO INTERRUPTER GP3S120			
PH102	8-749-013-23	PHOTO INTERRUPTER GP3S120			

Ref. No.	Part No.	Description	Remarks
		< IC LINK >	
⚠PS101	1-533-586-31	LINK, IC	
⚠PS331	1-533-586-31	LINK, IC	(998HF)
⚠PS600	1-532-841-21	LINK, IC	
		< TRANSISTOR >	
Q101	8-729-043-84	TRANSISTOR PT380F3	
Q102	8-729-043-84	TRANSISTOR PT380F3	
Q103	8-729-281-53	TRANSISTOR 2SC1815-GR	
Q140	8-729-901-06	TRANSISTOR DTA144EK	
Q201	8-729-230-49	TRANSISTOR 2SC2712-G	
Q205	8-729-421-19	TRANSISTOR UN2213	
Q208	8-729-230-49	TRANSISTOR 2SC2712-G	
Q209	8-729-216-21	TRANSISTOR 2SA1162Y-TE85L	
Q210	8-729-230-49	TRANSISTOR 2SC2712-G	
Q211	8-729-230-49	TRANSISTOR 2SC2712-G	
Q260	8-729-230-49	TRANSISTOR 2SC2712-G	
Q301	8-729-281-53	TRANSISTOR 2SC1815-GR	
Q331	8-729-802-91	TRANSISTOR 2SD879	
Q379	8-729-216-22	TRANSISTOR 2SA1162	
Q386	8-729-230-49	TRANSISTOR 2SC2712-G	
Q387	8-729-230-49	TRANSISTOR 2SC2712-G	
Q502	8-729-010-05	TRANSISTOR MSB709-RT1	
Q503	8-729-010-05	TRANSISTOR MSB709-RT1	
Q505	8-729-010-05	TRANSISTOR MSB709-RT1	
Q560	8-729-010-05	TRANSISTOR MSB709-RT1	
Q603	8-729-018-99	TRANSISTOR 2SD2394-F	
Q604	8-729-010-29	TRANSISTOR MSD601-RST1	
Q605	8-729-140-93	TRANSISTOR 2SB733-34	
Q606	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q731	8-729-421-19	TRANSISTOR UN2213	
Q801	8-729-216-21	TRANSISTOR 2SA1162Y-TE85L	
Q802	8-729-230-49	TRANSISTOR 2SC2712-G	
Q803	8-729-216-21	TRANSISTOR 2SA1162Y-TE85L	
Q804	8-729-230-49	TRANSISTOR 2SC2712-G	
Q805	8-729-900-51	TRANSISTOR DTA114TK	
Q806	8-729-230-49	TRANSISTOR 2SC2712-G	
Q807	8-729-230-49	TRANSISTOR 2SC2712-G	
Q808	8-729-230-49	TRANSISTOR 2SC2712-G	
Q809	8-729-900-51	TRANSISTOR DTA114TK	
Q810	8-729-230-49	TRANSISTOR 2SC2712-G	
Q830	8-729-216-22	TRANSISTOR 2SA1162	(998HF)
Q831	8-729-216-22	TRANSISTOR 2SA1162	(998HF)
Q832	8-729-421-19	TRANSISTOR UN2213	(998HF)
Q833	8-729-804-41	TRANSISTOR 2SB1122-S	(998HF)
Q834	8-729-421-19	TRANSISTOR UN2213	(998HF)
Q851	8-729-230-49	TRANSISTOR 2SC2712-G	
Q852	8-729-230-49	TRANSISTOR 2SC2712-G	
Q853	8-729-216-21	TRANSISTOR 2SA1162Y-TE85L	
Q854	8-729-216-21	TRANSISTOR 2SA1162Y-TE85L	
Q855	8-729-230-49	TRANSISTOR 2SC2712-G	
Q856	8-729-230-49	TRANSISTOR 2SC2712-G	
Q857	8-729-216-21	TRANSISTOR 2SA1162Y-TE85L	
Q871	8-729-010-05	TRANSISTOR MSB709-RT1	
Q872	8-729-010-29	TRANSISTOR MSD601-RST1	
Q873	8-729-010-29	TRANSISTOR MSD601-RST1	

Note :
The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

Note :
Les composants identifiés par une marque ⚠ sont critiques pour la sécurité.
Ne les remplacer que par une pièce portant le numéro spécifié.

Ref. No.	Part No.	Description			Remarks
Q874	8-729-424-08	TRANSISTOR UN2111			
Q875	8-729-010-29	TRANSISTOR MSD601-RST1			
Q931	8-729-012-31	TRANSISTOR 2SC4040-TL2-Q (998HF)			
Q932	8-729-900-51	TRANSISTOR DTA114TK (998HF)			
		< RESISTOR >			
R101	1-249-413-11	CARBON	470	5%	1/4W F
R102	1-216-089-00	METAL CHIP	47K	5%	1/10W
R103	1-249-437-11	CARBON	47K	5%	1/4W
R104	1-216-085-00	METAL CHIP	33K	5%	1/10W
R105	1-216-085-00	METAL CHIP	33K	5%	1/10W
R106	1-249-400-11	CARBON	39	5%	1/4W F
R107	1-249-400-11	CARBON	39	5%	1/4W F
R108	1-249-421-11	CARBON	2.2K	5%	1/4W F
R109	1-216-041-00	METAL CHIP	470	5%	1/10W
R110	1-216-041-00	METAL CHIP	470	5%	1/10W
R111	1-216-041-00	METAL CHIP	470	5%	1/10W
R118	1-216-089-00	METAL CHIP	47K	5%	1/10W
R119	1-216-077-00	METAL CHIP	15K	5%	1/10W
R124	1-249-421-11	CARBON	2.2K	5%	1/4W F
R125	1-249-421-11	CARBON	2.2K	5%	1/4W F
R126	1-247-885-00	CARBON	180K	5%	1/4W
R127	1-249-429-11	CARBON	10K	5%	1/4W
R128	1-216-065-91	RES,CHIP	4.7K	5%	1/10W
R129	1-216-073-00	METAL CHIP	10K	5%	1/10W
R130	1-216-073-00	METAL CHIP	10K	5%	1/10W
R131	1-208-806-11	RES,CHIP	10K	0.50%	1/10W
R132	1-208-806-11	RES,CHIP	10K	0.50%	1/10W
R133	1-249-436-11	CARBON	39K	5%	1/4W
R134	1-216-089-00	METAL CHIP	47K	5%	1/10W
R135	1-216-089-00	METAL CHIP	47K	5%	1/10W
R136	1-216-089-00	METAL CHIP	47K	5%	1/10W
R137	1-216-089-00	METAL CHIP	47K	5%	1/10W
R140	1-208-830-11	RES,CHIP	100K	0.50%	1/10W
R141	1-208-830-11	RES,CHIP	100K	0.50%	1/10W
R143	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R144	1-216-065-91	RES,CHIP	4.7K	5%	1/10W
R145	1-208-830-11	RES,CHIP	100K	0.50%	1/10W
R146	1-208-830-11	RES,CHIP	100K	0.50%	1/10W
R148	1-249-414-11	CARBON	560	5%	1/4W F
R149	1-216-065-91	RES,CHIP	4.7K	5%	1/10W
R150	1-216-049-00	METAL CHIP	1K	5%	1/10W
R151	1-216-037-00	METAL CHIP	330	5%	1/10W
R152	1-216-117-00	METAL CHIP	680K	5%	1/10W
R153	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R154	1-216-111-00	METAL CHIP	390K	5%	1/10W
R155	1-216-105-91	RES,CHIP	220K	5%	1/10W
R160	1-216-077-00	METAL CHIP	15K	5%	1/10W
R161	1-216-073-00	METAL CHIP	10K	5%	1/10W
R162	1-216-089-00	METAL CHIP	47K	5%	1/10W
R163	1-216-073-00	METAL CHIP	10K	5%	1/10W
R164	1-216-073-00	METAL CHIP	10K	5%	1/10W
R165	1-216-295-00	METAL CHIP	0	5%	1/10W
R166	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R167	1-216-097-91	RES,CHIP	100K	5%	1/10W
R168	1-249-417-11	CARBON	1K	5%	1/4W F
R169	1-216-073-00	METAL CHIP	10K	5%	1/10W
R170	1-216-073-00	METAL CHIP	10K	5%	1/10W
R201	1-216-041-00	METAL CHIP	470	5%	1/10W
R202	1-216-069-00	METAL CHIP	6.8K	5%	1/10W
R203	1-216-049-00	METAL CHIP	1K	5%	1/10W

Ref. No.	Part No.	Description			Remarks
R210	1-216-295-00	METAL CHIP	0	5%	1/10W
R213	1-249-429-11	CARBON	10K	5%	1/4W
R218	1-208-798-11	RES,CHIP	4.7K	0.50%	1/10W
R219	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
R221	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R222	1-216-051-00	METAL CHIP	1.2K	5%	1/10W
R228	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R229	1-216-055-00	METAL CHIP	1.8K	5%	1/10W
R230	1-216-045-00	METAL CHIP	680	5%	1/10W
R231	1-216-071-00	METAL CHIP	8.2K	5%	1/10W
R232	1-249-420-11	CARBON	1.8K	5%	1/4W F
R234	1-216-049-00	METAL CHIP	1K	5%	1/10W
R235	1-216-295-00	METAL CHIP	0	5%	1/10W
R236	1-216-049-00	METAL CHIP	1K	5%	1/10W
R239	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R240	1-216-049-00	METAL CHIP	1K	5%	1/10W
R247	1-216-025-91	RES,CHIP	100	5%	1/10W
R260	1-216-044-00	METAL CHIP	620	5%	1/10W
R261	1-216-044-00	METAL CHIP	620	5%	1/10W
R262	1-216-295-00	METAL CHIP	0	5%	1/10W
R263	1-216-295-00	METAL CHIP	0	5%	1/10W
R264	1-216-295-00	METAL CHIP	0	5%	1/10W
R265	1-216-295-00	METAL CHIP	0	5%	1/10W
R266	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
R267	1-216-073-00	METAL CHIP	10K	5%	1/10W
R268	1-216-081-00	METAL CHIP	22K	5%	1/10W
R269	1-249-421-11	CARBON	2.2K	5%	1/4W F
R270	1-247-863-91	CARBON	22K	5%	1/4W
R271	1-216-049-00	METAL CHIP	1K	5%	1/10W
R272	1-216-077-00	METAL CHIP	15K	5%	1/10W
R273	1-216-077-00	METAL CHIP	15K	5%	1/10W
R274	1-216-073-00	METAL CHIP	10K	5%	1/10W
R275	1-216-073-00	METAL CHIP	10K	5%	1/10W
R276	1-216-049-00	METAL CHIP	1K	5%	1/10W
R301	1-216-093-00	METAL CHIP	68K	5%	1/10W
R302	1-216-067-00	METAL CHIP	5.6K	5%	1/10W
R306	1-216-073-00	METAL CHIP	10K	5%	1/10W
R307	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R309	1-216-067-00	METAL CHIP	5.6K	5%	1/10W
R310	1-216-129-00	METAL CHIP	2.2M	5%	1/10W
R311	1-216-051-00	METAL CHIP	1.2K	5%	1/10W
R312	1-216-079-00	METAL CHIP	18K	5%	1/10W
R313	1-216-109-00	METAL CHIP	330K	5%	1/10W
R314	1-216-035-00	METAL CHIP	270	5%	1/10W
R315	1-216-067-00	METAL CHIP	5.6K	5%	1/10W
R316	1-216-071-00	METAL CHIP	8.2K	5%	1/10W
R317	1-216-079-00	METAL CHIP	18K	5%	1/10W
R318	1-216-075-00	METAL CHIP	12K	5%	1/10W
R320	1-216-047-91	RES,CHIP	820	5%	1/10W
R331	1-217-671-11	METAL CHIP	1	5%	1/10W
R332	1-216-063-91	RES,CHIP	3.9K	5%	1/10W (798HF)
R332	1-216-067-00	METAL CHIP	5.6K	5%	1/10W (998HF)
R333	1-249-401-11	CARBON	47	5%	1/4W F
R334	1-216-031-00	METAL CHIP	180	5%	1/10W
R335	1-249-396-11	CARBON	18	5%	1/4W F (998HF)
R341	1-216-049-00	METAL CHIP	1K	5%	1/10W
R342	1-216-049-00	METAL CHIP	1K	5%	1/10W
R344	1-216-055-00	METAL CHIP	1.8K	5%	1/10W

Ref. No.	Part No.	Description			Remarks
R346	1-216-065-91	RES,CHIP	4.7K	5%	1/10W
R347	1-216-065-91	RES,CHIP	4.7K	5%	1/10W
R348	1-216-033-00	METAL CHIP	220	5%	1/10W
R368	1-216-133-00	METAL CHIP	3.3M	5%	1/10W
R370	1-216-065-91	RES,CHIP	4.7K	5%	1/10W
R371	1-208-820-11	RES,CHIP	39K	0.50%	1/10W
R372	1-216-065-91	RES,CHIP	4.7K	5%	1/10W
R373	1-216-033-00	METAL CHIP	220	5%	1/10W
R374	1-216-033-00	METAL CHIP	220	5%	1/10W
R378	1-249-434-11	CARBON	27K	5%	1/4W
R379	1-216-049-00	METAL CHIP	1K	5%	1/10W
R380	1-216-025-91	RES,CHIP	100	5%	1/10W
R381	1-216-025-91	RES,CHIP	100	5%	1/10W
R382	1-216-295-00	METAL CHIP	0	5%	1/10W
R383	1-216-295-00	METAL CHIP	0	5%	1/10W
R384	1-216-091-00	METAL CHIP	56K	5%	1/10W
R385	1-216-091-00	METAL CHIP	56K	5%	1/10W
R386	1-216-049-00	METAL CHIP	1K	5%	1/10W
R387	1-216-049-00	METAL CHIP	1K	5%	1/10W
R389	1-216-073-00	METAL CHIP	10K	5%	1/10W
R391	1-216-049-00	METAL CHIP	1K	5%	1/10W
R392	1-216-049-00	METAL CHIP	1K	5%	1/10W
R393	1-216-295-00	METAL CHIP	0	5%	1/10W
R501	1-216-295-00	METAL CHIP	0	5%	1/10W
R502	1-216-033-00	METAL CHIP	220	5%	1/10W
R505	1-216-059-00	METAL CHIP	2.7K	5%	1/10W
R506	1-216-051-00	METAL CHIP	1.2K	5%	1/10W
R507	1-216-081-00	METAL CHIP	22K	5%	1/10W
R508	1-216-049-00	METAL CHIP	1K	5%	1/10W
R510	1-216-081-00	METAL CHIP	22K	5%	1/10W
R514	1-216-073-00	METAL CHIP	10K	5%	1/10W
R515	1-216-101-00	METAL CHIP	150K	5%	1/10W
R517	1-216-063-91	RES,CHIP	3.9K	5%	1/10W
R518	1-216-043-91	RES,CHIP	560	5%	1/10W
R519	1-216-043-91	RES,CHIP	560	5%	1/10W
R520	1-216-033-00	METAL CHIP	220	5%	1/10W
R521	1-216-073-00	METAL CHIP	10K	5%	1/10W
R522	1-216-073-00	METAL CHIP	10K	5%	1/10W
R523	1-216-073-00	METAL CHIP	10K	5%	1/10W
R560	1-216-022-00	METAL CHIP	75	5%	1/10W
R561	1-216-021-00	METAL CHIP	68	5%	1/10W
R562	1-249-407-11	CARBON	150	5%	1/4W F
R563	1-249-407-11	CARBON	150	5%	1/4W F
R565	1-216-037-00	METAL CHIP	330	5%	1/10W
R615	1-216-399-00	METAL OXIDE	6.8	5%	3W F
R617	1-249-417-11	CARBON	1K	5%	1/4W F
R618	1-249-413-11	CARBON	470	5%	1/4W F (998HF: Chilean, PX)
R619	1-249-413-11	CARBON	470	5%	1/4W F (998HF: Chilean, PX)
R621	1-216-089-00	METAL CHIP	47K	5%	1/10W
R622	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R623	1-247-843-11	CARBON	3.3K	5%	1/4W
R624	1-216-430-11	METAL OXIDE	390	5%	1W F
R625	1-249-429-11	CARBON	10K	5%	1/4W
R626	1-249-417-11	CARBON	1K	5%	1/4W F
R627	1-247-815-91	CARBON	220	5%	1/4W
R628	1-247-815-91	CARBON	220	5%	1/4W
R701	1-216-049-00	METAL CHIP	1K	5%	1/10W
R702	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R705	1-212-893-00	FUSIBLE	330	5%	1/4W F
R706	1-216-113-00	METAL CHIP	470K	5%	1/10W
R709	1-216-295-00	METAL CHIP	0	5%	1/10W
R710	1-216-295-00	METAL CHIP	0	5%	1/10W
R711	1-216-295-00	METAL CHIP	0	5%	1/10W
R712	1-216-295-00	METAL CHIP	0	5%	1/10W
R731	1-216-049-00	METAL CHIP	1K	5%	1/10W
R732	1-216-049-00	METAL CHIP	1K	5%	1/10W
R733	1-249-425-11	CARBON	4.7K	5%	1/4W F
R735	1-216-049-00	METAL CHIP	1K	5%	1/10W
R736	1-216-295-00	METAL CHIP	0	5%	1/10W
R737	1-216-081-00	METAL CHIP	22K	5%	1/10W
R738	1-216-081-00	METAL CHIP	22K	5%	1/10W
R739	1-249-429-11	CARBON	10K	5%	1/4W
R748	1-216-065-91	RES,CHIP	4.7K	5%	1/10W
R749	1-216-049-00	METAL CHIP	1K	5%	1/10W
R801	1-216-049-00	METAL CHIP	1K	5%	1/10W
R802	1-216-049-00	METAL CHIP	1K	5%	1/10W
R803	1-216-039-00	METAL CHIP	390	5%	1/10W
R804	1-216-039-00	METAL CHIP	390	5%	1/10W
R805	1-216-049-00	METAL CHIP	1K	5%	1/10W
R806	1-216-043-91	RES,CHIP	560	5%	1/10W
R807	1-216-039-00	METAL CHIP	390	5%	1/10W
R808	1-216-033-00	METAL CHIP	220	5%	1/10W
R809	1-216-077-00	METAL CHIP	15K	5%	1/10W
R810	1-216-075-00	METAL CHIP	12K	5%	1/10W
R811	1-216-033-00	METAL CHIP	220	5%	1/10W
R812	1-216-043-91	RES,CHIP	560	5%	1/10W
R813	1-216-069-00	METAL CHIP	6.8K	5%	1/10W
R814	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R815	1-216-067-00	METAL CHIP	5.6K	5%	1/10W
R816	1-216-075-00	METAL CHIP	12K	5%	1/10W
R817	1-216-077-00	METAL CHIP	15K	5%	1/10W
R818	1-216-039-00	METAL CHIP	390	5%	1/10W
R819	1-216-045-00	METAL CHIP	680	5%	1/10W
R820	1-216-039-00	METAL CHIP	390	5%	1/10W
R821	1-216-045-00	METAL CHIP	680	5%	1/10W
R822	1-216-049-00	METAL CHIP	1K	5%	1/10W
R823	1-216-041-00	METAL CHIP	470	5%	1/10W
R824	1-216-043-91	RES,CHIP	560	5%	1/10W
R825	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R826	1-216-025-91	RES,CHIP	100	5%	1/10W
R827	1-216-045-00	METAL CHIP	680	5%	1/10W
R828	1-216-043-91	RES,CHIP	560	5%	1/10W
R830	1-216-011-00	METAL CHIP	27	5%	1/10W (998HF)
R831	1-216-041-00	METAL CHIP	470	5%	1/10W (998HF)
R832	1-208-787-11	RES,CHIP	1.6K	0.50%	1/10W (998HF)
R833	1-216-095-00	METAL CHIP	82K	5%	1/10W (998HF)
R834	1-216-089-00	METAL CHIP	47K	5%	1/10W (998HF)
R835	1-216-689-11	METAL CHIP	39K	0.5%	1/10W (998HF)

MA-318 POWER BLOCK SR801

Ref. No.	Part No.	Description			Remarks
R836	1-216-061-00	METAL CHIP	3.3K	5%	1/10W (998HF)
R837	1-216-073-00	METAL CHIP	10K	5% 1/10W (998HF)	
R844	1-216-069-00	METAL CHIP	6.8K	5%	1/10W
R851	1-208-820-11	RES,CHIP	39K	0.50%	1/10W
R852	1-208-802-11	RES,CHIP	6.8K	0.50%	1/10W
R853	1-208-792-11	RES,CHIP	2.7K	0.50%	1/10W
R855	1-208-770-11	RES,CHIP	330	0.50%	1/10W
R856	1-208-758-11	RES,CHIP	100	0.50%	1/10W
R857	1-208-790-11	RES,CHIP	2.2K	0.50%	1/10W
R858	1-216-051-00	METAL CHIP	1.2K	5%	1/10W
R859	1-208-800-11	RES,CHIP	5.6K	0.50%	1/10W
R860	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R861	1-216-065-91	RES,CHIP	4.7K	5%	1/10W
R862	1-208-806-11	RES,CHIP	10K	0.50%	1/10W
R864	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R865	1-216-107-00	METAL CHIP	270K	5%	1/10W
R871	1-249-429-11	CARBON	10K	5%	1/4W
R872	1-247-807-31	CARBON	100	5%	1/4W
R873	1-247-807-31	CARBON	100	5%	1/4W
R874	1-247-807-31	CARBON	100	5%	1/4W
R875	1-247-807-31	CARBON	100	5%	1/4W
R876	1-216-081-00	METAL CHIP	22K	5%	1/10W
R877	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R878	1-216-073-00	METAL CHIP	10K	5%	1/10W
R879	1-249-417-11	CARBON	1K	5%	1/4W F
R880	1-249-429-11	CARBON	10K	5%	1/4W
R881	1-216-043-91	RES,CHIP	560	5%	1/10W
R882	1-216-049-00	METAL CHIP	1K	5%	1/10W
R883	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
R884	1-216-047-91	RES,CHIP	820	5%	1/10W
R885	1-247-807-31	CARBON	100	5%	1/4W
R886	1-216-073-00	METAL CHIP	10K	5%	1/10W
R887	1-216-081-00	METAL CHIP	22K	5%	1/10W
R888	1-216-081-00	METAL CHIP	22K	5%	1/10W
R889	1-247-807-31	CARBON	100	5%	1/4W
R890	1-216-049-00	METAL CHIP	1K	5%	1/10W
R931	1-249-394-11	CARBON	12	5%	1/4W F (998HF)
R932	1-216-083-00	METAL CHIP	27K	5%	1/10W (998HF)
R934	1-216-073-00	METAL CHIP	10K	5%	1/10W (998HF)
R980	1-216-049-00	METAL CHIP	1K	5%	1/10W
R981	1-216-295-00	METAL CHIP	0	5%	1/10W
		< VARIABLE RESISTOR >			
RV731	1-241-766-11	RES, ADJ, CERMET 47K			
		< SWITCH >			
S101	1-762-108-11	SWITCH, PUSH (1 KEY)(REC PROOF)			
S102	1-771-155-11	SWITCH, ROTARY (MECHANISM MODE)			
S701	1-571-588-11	SWITCH, SLIDE (3CH/4CH)			
		< TRANSFORMER >			
T331	1-431-097-11	TRANSFORMER, BIAS OSCILLATION (798HF)			
T331	1-431-100-11	TRANSFORMER, BIAS OSCILLATION (998HF)			
T931	1-423-415-11	TRANSFORMER, BIAS OSCILLATION (998HF)			

Ref. No.	Part No.	Description			Remarks
		< TUNER >			
TU700	8-598-289-00	TUNER, FSS BTF-MA401			
		< VIBRATOR >			
X160	1-760-494-11	VIBRATOR, CRYSTAL 16MHz			
X202	1-577-380-11	VIBRATOR, CRYSTAL 3.579545MHz			
X500	1-577-381-11	VIBRATOR, CRYSTAL 14.31818MHz			
X501	1-577-165-11	VIBLATOR, CERAMIC			
X871	1-577-133-21	VIBRATOR, CRYSTAL			
⚠	1-468-281-11	POWER BLOCK SR801 (EXCEPT Chilean, PX) ********** (Ref. No.: 8,000 Series)			
		< CAPACITOR >			
⚠C101	1-104-705-51	FILM	0.1uF	250V	
⚠C102	1-104-705-51	FILM	0.1uF	250V	
C106	1-119-882-41	ELECT	120uF	200V	
C107	1-126-963-11	ELECT	4.7uF	50V	
C110	1-130-491-51	FILM	0.047uF	50V	
C111	1-130-491-51	FILM	0.047uF	50V	
C201	1-126-967-11	ELECT	47uF	50V	
C202	1-126-183-11	ELECT	1000uF	16V	
C203	1-126-934-11	ELECT	220uF	16V	
C204	1-126-797-11	ELECT	1000uF	10V	
C205	1-126-925-11	ELECT	470uF	10V	
C206	1-126-967-11	ELECT	47uF	50V	
C207	1-126-925-11	ELECT	470uF	10V	
C208	1-126-960-11	ELECT	1uF	50V	
		< DIODE >			
D103	8-719-920-32	DIODE	ERA15-02		
D104	8-719-109-61	DIODE	RD3.0ES		
D105	8-719-911-19	DIODE	1SS119		
D106	8-719-904-05	DIODE	1N4005		
D107	8-719-904-05	DIODE	1N4005		
D108	8-719-904-05	DIODE	1N4005		
D109	8-719-904-05	DIODE	1N4005		
D110	8-719-904-05	DIODE	1N4005		
D201	8-719-061-02	DIODE	PR1003		
D202	8-719-510-73	DIODE	S3L20U		
D204	8-719-027-20	DIODE	D3S4M		
D205	8-719-058-08	DIODE	RD51F		
D206	8-719-061-02	DIODE	PR1003		
D207	8-719-061-02	DIODE	PR1003		
		< FUSE >			
⚠F101	1-533-296-11	FUSE	2A	125V	
		< FERRITE BEAD >			
FB1	9-902-053-01	FERRITE BEAD			
		< IC >			
⚠IC201	8-759-420-19	IC	AN1431T		

Note :
The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

Note :
Les composants identifiés par une marque ⚠ sont critiques pour la sécurité.
Ne les remplacer que par une pièce portant le numéro spécifié.

Ref. No.	Part No.	Description			Remarks
		< PHOTOCOUPLER >			
⚠PC101	8-719-018-29	PHOTOCOUPLER	ON3131		
		< TRANSISTOR >			
Q101	8-729-904-98	TRANSISTOR	2SC4054		
Q102	8-729-012-31	TRANSISTOR	2SC4040		
		< RESISTOR >			
⚠R101	1-219-779-51	CARBON	6.8M	10%	1/2W
⚠	1-465-282-11	POWER BLOCK SR709 (Chilean, PX)			
		**********			
					(Ref. No.: 9,000 Series)
		< CAPACITOR >			
⚠C101	1-104-705-51	FILM	0.1uF		250V
⚠C102	1-104-705-51	FILM	0.1uF		250V
C111	1-126-947-11	ELECT	47uF		35V
C112	1-130-491-51	FILM	0.1uF		50V
C114	1-130-491-51	FILM	0.1uF		50V
C115	1-130-491-51	FILM	0.1uF		50V
C201	1-128-552-11	ELECT	47uF		63V
C202	1-126-183-11	ELECT	1000uF		16V
C203	1-126-934-11	ELECT	220uF		16V
C204	1-126-183-11	ELECT	1000uF		16V
C205	1-126-925-11	ELECT	470uF		10V
C206	1-126-967-11	ELECT	47uF		50V
C207	1-126-925-11	ELECT	470uF		10V
		< DIODE >			
D101	8-719-904-05	DIODE	1N4005		
D102	8-719-904-05	DIODE	1N4005		
D103	8-719-904-05	DIODE	1N4005		
D104	8-719-904-05	DIODE	1N4005		
D105	8-719-030-24	DIODE	EG01C		
D107	8-719-061-02	DIODE	PR1003		
D108	8-719-061-02	DIODE	PR1003		
D201	8-719-030-24	DIODE	EG01C		
D202	8-719-510-73	DIODE	S3L20U		
D203	8-719-027-22	DIODE	D3S6M		
D205	8-719-030-24	DIODE	EG01C		
D206	8-719-061-02	DIODE	PR1003		
		< FUSE >			
⚠F101	1-532-388-31	FUSE	T2A		250V
		< IC >			
⚠IC201	8-759-420-19	IC	AN1431T		
		< PHOTOCOUPLER >			
⚠PC101	8-749-010-65	PHOTOCOUPLER	PC123		
		< RESISTOR >			
R201	1-260-336-51	CARBON	4.7		1/2W
R208	1-249-401-51	CARBON	47	5%	1/4W
R209	1-249-393-51	CARBON	10	5%	1/4W

Ref. No.	Part No.	Description	Remarks
		MISCELLANEOUS	
		**********	
⚠9	1-777-854-21	CORD, POWER	
11	1-762-844-21	SWITCH, ROTARY	
14	1-783-131-11	CABLE, FLAT (FFM-16)	
⚠54	1-468-281-11	POWER BLOCK SR801 (EXCEPT Chilean, PX)	
⚠54	1-468-282-11	POWER BLOCK SR709 (Chilean, PX)	
56	1-779-725-11	CONNECTOR, BOARD TO BOARD 5P	
704	1-500-144-11	HEAD, FE	
721	A-6759-620-A	HEAD BLOCK ASSY, ACE (TDK)	
769	8-848-576-02	DRUM ASSY, UPPER DZR-45-R	(EXCEPT 998HF)
769	8-848-594-02	DRUM ASSY, UPPER DZR-51-R (998HF)	
770	8-848-666-11	DRUM ASSY, LOWER DZL-51B/J-RP	
776	8-839-044-02	DRUM ASSY DZH-94A/Z-RP (M901)	(EXCEPT 998HF)
776	8-839-046-02	DRUM ASSY DZH-96A-R (M901)(998HF)	
M902	1-698-971-11	MOTOR, DC	
M903	X-3947-577-1	MOTOR ASSY, CAM	
		ACCESSORIES & PACKING MATERIALS	
		**********	
	1-475-554-41	COMMANDER, STANDARD (RMT-V232C)	(798HF)
	1-475-605-11	COMMANDER, STANDARD (RMT-V229)	(998HF)
	1-569-008-11	ADAPTOR, CONVERSION 2P	(998HF: Chilean, PX)
	1-569-008-21	ADAPTOR, CONVERSION 2P	(998HF: Chilean, PX)
	1-696-592-11	CORD, CONNECTION (NTSC) (FOR RF) 1.5m	
	1-776-258-11	CORD, AVC CONNECTION (FOR VIDEO/AUDIO)	1.5m
	1-783-325-11	CORD, CONNECTION (CABLE MOUSE)	
	3-861-047-11	MANUAL, INSTRUCTION (ENGLISH)(798HF)	
	3-861-047-21	MANUAL, INSTRUCTION (FRENCH)	(798HF: Canadian)
	3-861-048-11	MANUAL, INSTRUCTION (ENGLISH)	(998HF: US, Canadian, PX)
	3-861-048-21	MANUAL, INSTRUCTION (FRENCH)	(998HF: Canadian)
	3-861-048-31	MANUAL, INSTRUCTION (SPANISH)	(998HF: Chilean, Mexican)
	3-979-315-01	COVER, JACK	
*	3-979-316-12	INDIVIDUAL CARTON (798HF)	
*	3-979-316-21	INDIVIDUAL CARTON	(998HF: US, Canadian, PX)
*	3-979-316-62	INDIVIDUAL CARTON(998HF: Chilean, Mexican)	
*	3-979-317-01	CUSHION	
*	3-979-512-01	SPACER	
		**********	
		HARDWARE LIST	
		**********	
#1	7-685-648-79	SCREW +BVTP 3X12 TYPE2 IT-3	
#2	7-685-646-79	SCREW +BVTP 3X8 TYPE2 IT-3	
#702	7-685-646-79	SCREW +BVTP 3X8 TYPE2 IT-3	
#702	7-682-547-04	SCREW +P 3X6	
#703	7-685-133-19	SCREW (DIA. 2.6) (IT3B)	

Note :
The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

Note :
Les composants identifiés par une marque ⚠ sont critiques pour la sécurité.
Ne les remplacer que par une pièce portant le numéro spécifié.

9-921-672-11

Sony Corporation
Home A&V Products Company

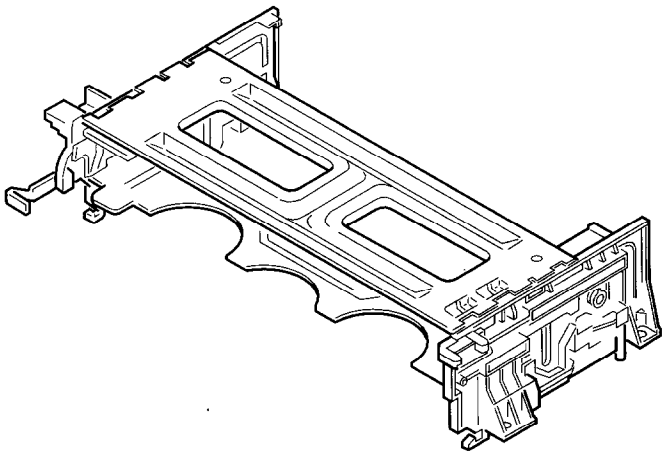
98C1637-1
Printed in Japan © 1998.3
Published by General Engineering Dept.
(Osaki East)

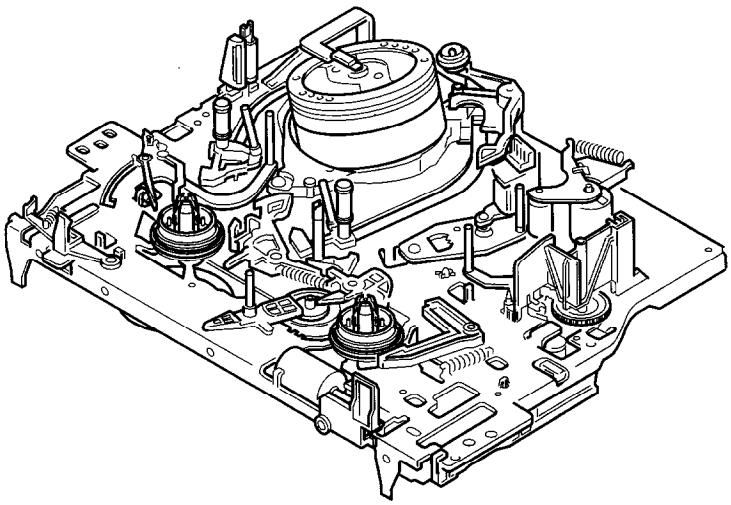
VHS MECHANICAL ADJUSTMENT MANUAL VI

S MECHANISM

VHS

Please use with the service manual.





VHS TAPE TRANSPORT MECHANISM DECK

MICROFILM

SONY®

ADJUSTMENTS REQUIRED THE FOLLOWING PARTS REPLACEMENT

ADJUSTMENTS / PARTS		4-1-1 TENSION REGULATOR POSITION/TENSION ADJUSTMENT	4-1-2 CHECKING THE TENSION AND TORQUE	4-1-3 X-VALUE ADJUSTMENT	4-1-4 HEIGHT ADJUSTMENT OF GUIDE ROLLERS NO. 3 AND NO. 6	4-1-5 ACE HEAD HEIGHT AND AZIMUTH ADJUSTMENT	4-1-6 X-VALUE FINE ADJUSTMENT	4-1-7 HEIGHT ADJUSTMENT OF GUIDE ROLLER NO. 8	4-1-8 CHECKING THE LINEARITY AND FLUCTUATION OF THE RF OUTPUT
3-25	REEL (S) TABLE	O	△	×	△	×	×	×	×
3-25	TG1 ASSEMBLY	O	×	×	△	×	×	×	×
3-6	FEH ASSEMBLY	×	×	×	△	×	×	×	×
3-23	DRUM BASE	×	×	O	O	O	O	O	O
3-2	DRUM ASSEMBLY	×	×	O	O	O	O	O	O
3-24	SHUTTLE (S) AND SHUTTLE (T) BLOCK ASSEMBLIES	×	×	O	O	O	O	O	×
3-5	ACE HEAD BLOCK	×	×	O	△	O	O	△	×
3-4	CAPSTAN MOTOR	×	×	×	△	O	O	O	×
3-3	PINCHI PRESS BLOCK ASS'Y	×	×	×	×	O	O	O	×
3-3	TG8 ASSEMBLY	×	×	×	×	×	×	O	×
3-10	REEL (T) TABLE	×	×	×	×	×	×	△	×
3-19	PULLEY GEAR ASSEMBLY	×	O	×	×	×	×	×	×
3-11	PENDULUM ARM ASSEMBLY	×	O	×	×	×	×	×	×

O: ADJUST
△: CHECK
×: NOT REQUIRED

1. PREPARATION FOR MECHANISM CHECKS, ADJUSTMENTS AND REPLACEMENT

For removal of the cabinet, printed wiring boards and others, please refer to the service manual "DISASSEMBLY".

1-1. LOADING AND THREADING PROCEDURE WHEN THE POWER TURNS OFF

1-1-1. LOADING AND THREADING PROCEDURE WITH HANDS

1) Turn cam motor in the arrow Ⓐ direction until loading and threading are end.

1-1-2. LOADING AND THREADING PROCEDURE WITH REGULATED DC POWER SUPPLY

1) Applying approx. +9V (300mA) to cam motor with regulated DC power supply makes it loading and threading.

Note : When loading and threading without cassette, claws are caught in four positions as following figure (in the order ①-②-③-④).
So release them with hands.

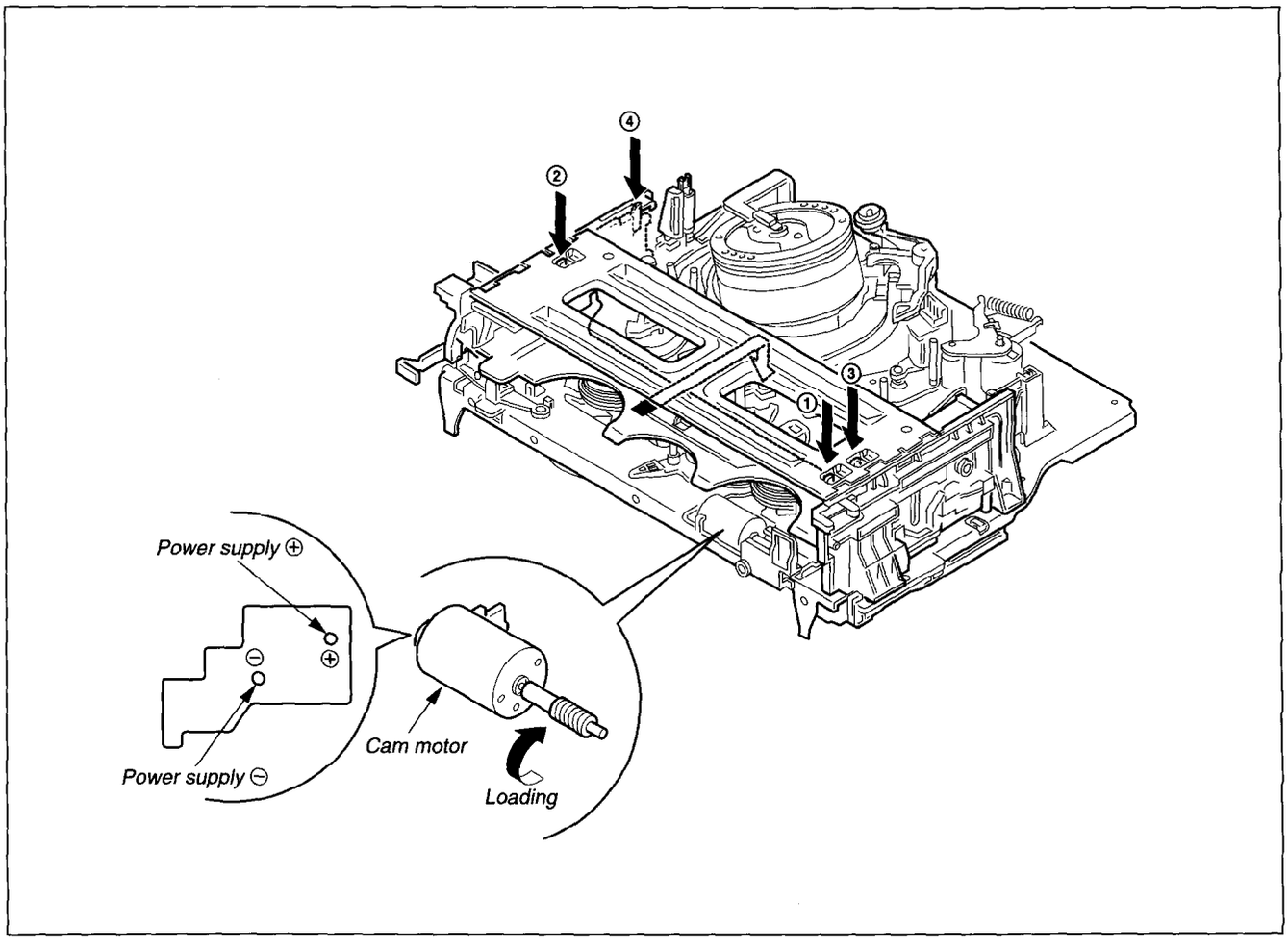


Fig. 1-1

1-2. UNLOADING AND UNTHREADING PROCEDURE WHEN THE POWER TURNS OFF

1-2-1. UNLOADING AND UNTHREADING PROCEDURE WITH HANDS

1) Turn cam motor in the arrow Ⓑ direction until unthreading is end.
2) Turn capstan motor in the arrow Ⓒ direction to take up tape in cassette.
3) Turn cam motor in the arrow Ⓑ direction until unloading is end.

1-2-2. UNLOADING AND UNTHREADING PROCEDURE WITH REGULATED DC POWER SUPPLY

1) Apply approx. +5V (300mA) to contrary polarities of cam motor.
2) Unthreading operation begins, tape guides return to their initial positions (Unthreading operation is end but tape remains), then stop cam motor by *turning power off*.

Note : When unloading begins and cassette lid is closed, turn cam motor in the arrow Ⓐ direction to open tape guard.

3) Turn capstan motor in the arrow Ⓒ direction to take up tape in cassette.

Note : Take care that tape is not caught at pinch roller.

4) Check that tape is no loosened completely, and apply approx. +5V (300mA) to contrary polarities of cam motor with regulated DC power supply.

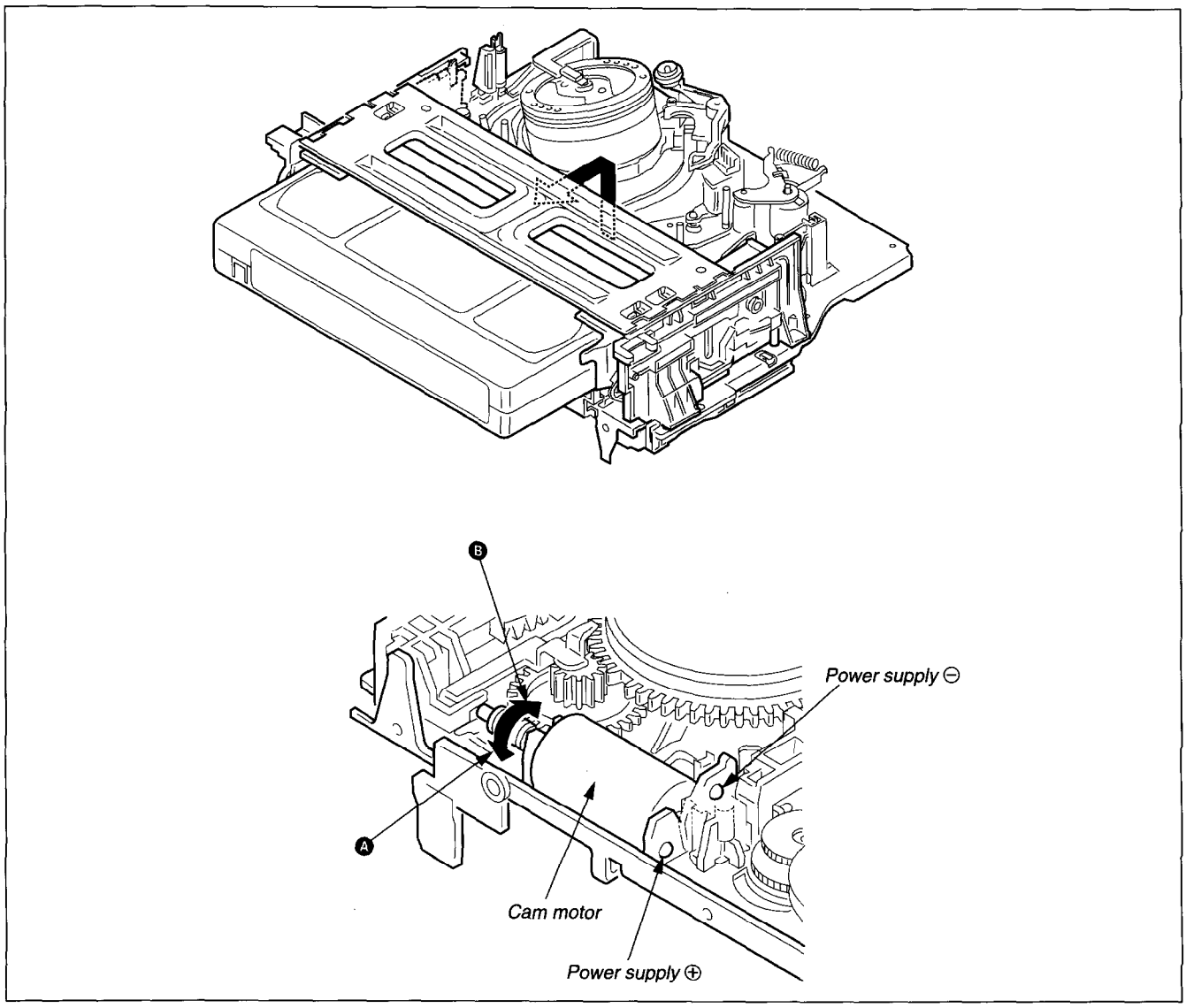


Fig. 1-2

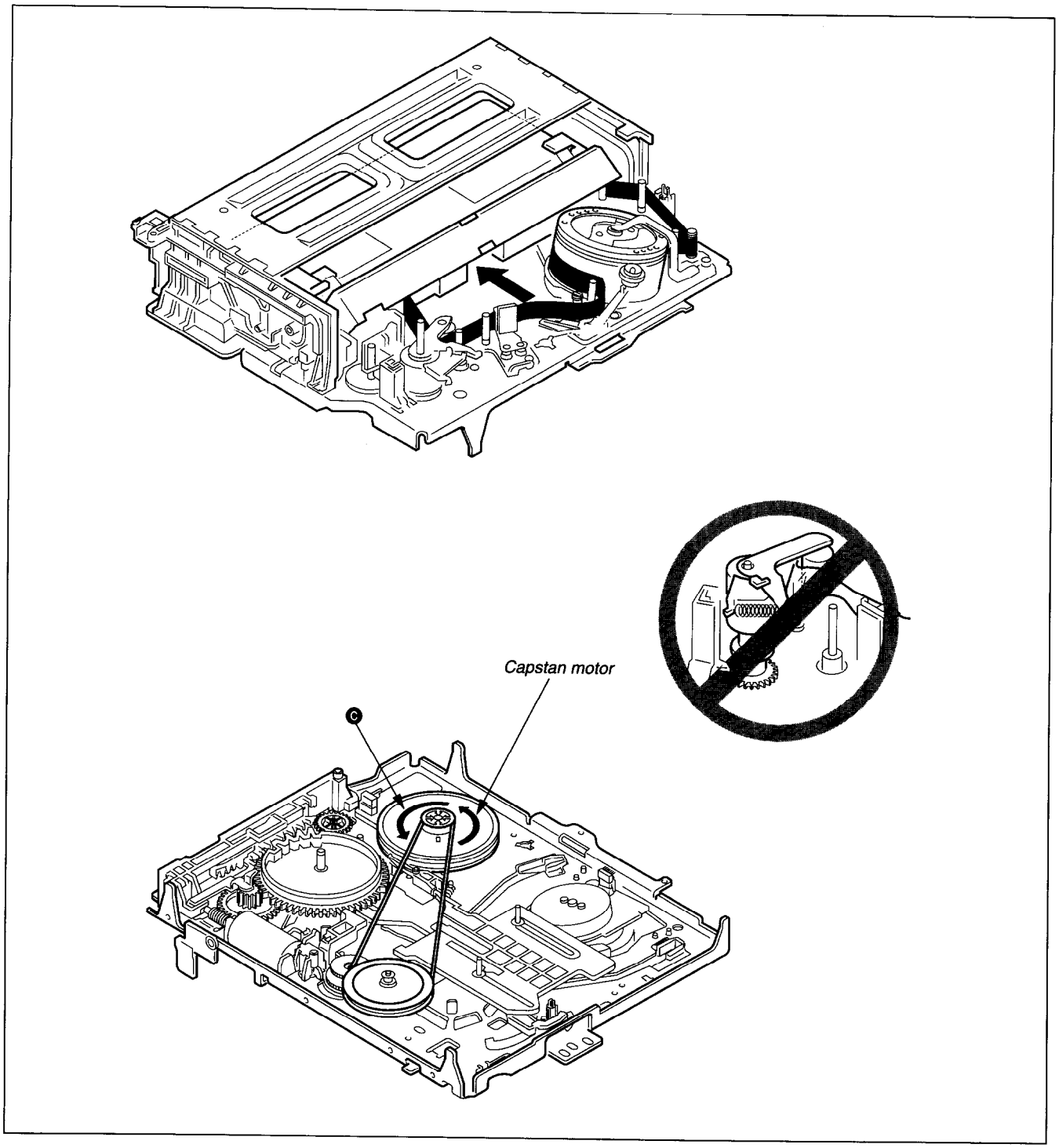


Fig. 1-3

1-3. HOW TO COMPLETE THREADING WITHOUT CASSETTE COMPARTMENT

Note 1 : Put the FL block assembly removed the FL top plate on the bottom not to put dust or grease the top sensor and the end sensor luminous plates or not to scratch them.

1) Pull out AC plug from wall outlet.
2) Shade near the end and top sensors with a black masking tape or the like.
3) Connect AC plug to wall outlet.

Note 2 : In this condition, some modes can not be set.
To make loading in this condition, set the video cassette tape without REC proof claw, pull the REC proof lever once and release it.
On loading without video cassette tape, it is necessary to deceive the microcomputer by turning the reel (T) table with hand.
Fast forward and rewind are not available.

Note 3 : After above mentioned operation, be sure to return the mode in the following order.

4) Pull out AC plug from wall outlet to reset the system control microcomputer.
5) Remove the tape near the end and top sensors.

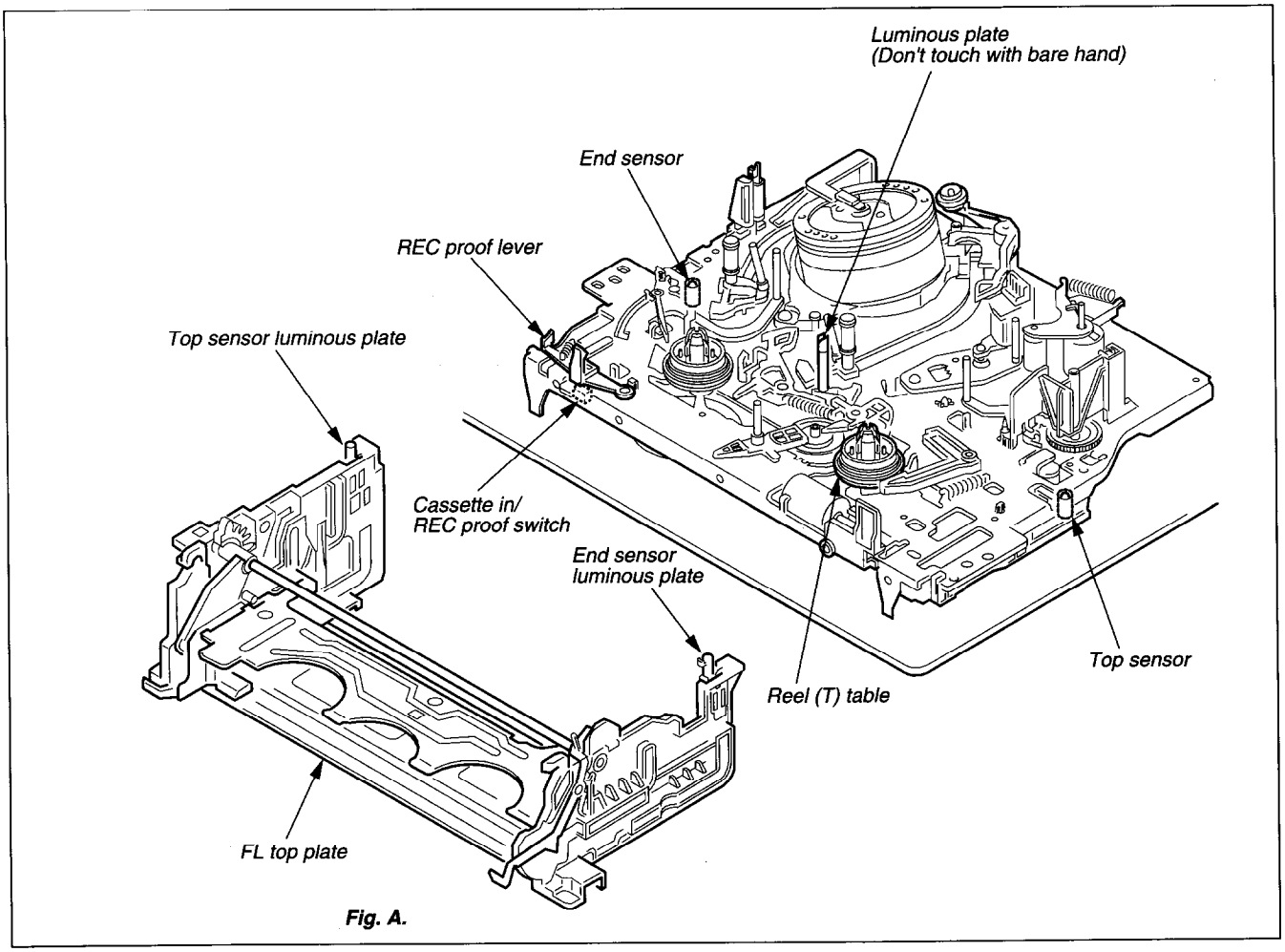


Fig. 1-4

2. PERIODIC CHECK AND REPLACEMENT

In order to obtain the best performance from this unit and make full use of its capabilities, and to extend the life of the unit and tapes, it is recommended that the following periodic checks and maintenance be performed.

* The following must be done after every repair regardless of how many hours the user has operated the machine.

2-1. CLEANING OF ROTATING HEAD DISK ASSEMBLY

1) Press a chamois cloth (Jig Ref. No. J-4) which has been dipped in cleaning fluid (Jig Ref. No. J-3) lightly against the rotating drum assembly, then do the cleaning by slowly rotating the rotating head disk by the hand. (Never try to clean by using the motor to turn it.)
2) Never try to clean by moving the chamois cloth at a vertical angle to the head tip. There is a very great danger of damaging the head tip if this is done.

2-2. CLEANING OF THE TAPE MOVEMENT SYSTEM

1) Clean the surfaces which the tape contacts during its movement (tape guide, drum assembly surface, capstan, pinch roller, etc.) with a chamois cloth that has been dipped in cleaning fluid.

2-3. CLEANING THE DRIVE SYSTEM

1) Clean the driving parts with a cloth that has been dipped in cleaning fluid.

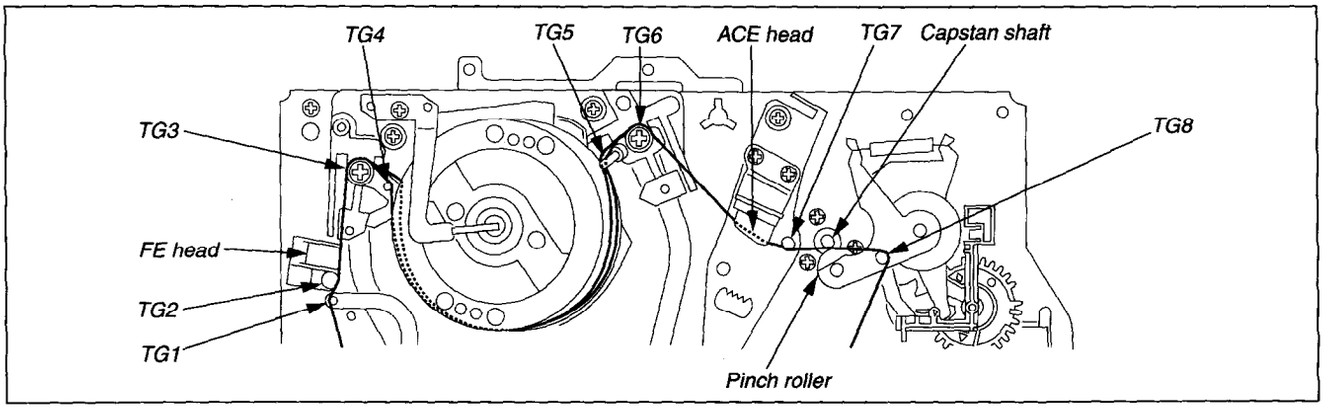


Fig. 2-1 Parts requiring cleaning

2-4. PERIODIC CHECK ITEMS

Perform the maintenance and check listed on the table below, according to users' operating hours.

Maintenance & Check \ Operating Hours (H)		500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	Remarks
Tape Transportation System	Cleaning of tape transportation system	○	○	○	○	○	○	○	○	○	○	This cleaning must be done whenever a repair is made.
	Cleaning and degaussing of ACE assembly	○	○	○	○	○	○	○	○	○	○	
	Cleaning and degaussing of upper drum assembly	○	○	○	○	○	○	○	○	○	○	The life of the head varies, depending on operational conditions and method.
Performance Confirmation	Abnormal sound	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	Adjust or replace the section which causes abnormal sound.
	Measurement of FWD back tension	—	☆	—	☆	—	☆	—	☆	—	☆	Confirmation must be made according to 4-1-1. Specified value : Adjust to 5.0504 to 6.5214mN•m (51.5 to 66.5g•cm) (without TC assembly*) or 3.7755 to 5.0994mN•m (38.5 to 52.0g•cm)(with TC assembly*)
	Confirmation of brake system	—	☆	—	☆	—	☆	—	☆	—	☆	Confirmation must be made according to section.
	Confirmation of record and playback functions	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	Perform the confirmation whenever repair is made.
	Measurement of forward torque	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	Adjust to 4.9033 to 8.8259mN•m (50 to 90 g•cm)

Note : On overhaul
When overhauling the unit, replace parts as indicated in the above table.

○ : Cleaning ☆ : Confirmation

2-5. TOOLS AND FIXTURES REQUIRED FOR SERVICING

Ref. No.	Name		Part No.	Caved Jig No.	Remarks
J-1	Torque Measurement Cassette VHT-103S		J-6090-072-A		For FWD & back tension torque measurement.
	Torque Measurement Cassette VHT-404S		J-6082-012-A		For CUE and REVIEW torque measurement.
J-2	Alignment Tape	KRV-52NE* (NTSC)	8-192-605-41		Tape path, Audio azimuth, X-value adjustments
		KRV-51N2 (NTSC)	8-192-605-32		Electrical adjustments, Operation checks
		KRV-52PL (PAL)	8-192-605-46		Tape path, Audio azimuth, X-value adjustments
		KRV-51P (PAL)	8-192-605-36		Electrical adjustments, Operation checks
J-3	Cleaning fluid		Y-2031-001-0	—	
J-4	Chamois Leather		2-034-697-00	—	
J-5	Dental Mirror (With Handle) Dental Mirror (Mirror)		J-6080-029-A J-6080-030-1	SL-5052	Tape path and tape traveling adjustments or checks.
J-6	FLOIL SG-646		7-651-000-44		Net. 20g
J-7	Diamond Oil NT-68		7-661-018-18		
J-8	Screw Lock G (1401B)		7-432-114-11		
J-9	X-value adjusting driver		J-6090-073-A		X-value adjustment
J-10	Mode Selector II		J-6082-282-A	—	For S mechanism stand-alone operation
J-11	Connector Conversion Jig		J-6090-052-A	—	For S mechanism stand-alone operation
J-12	S Type Capstan Board		J-6090-075-A	—	For S mechanism stand-alone operation

* Be sure to use KRV-52NE having version number.

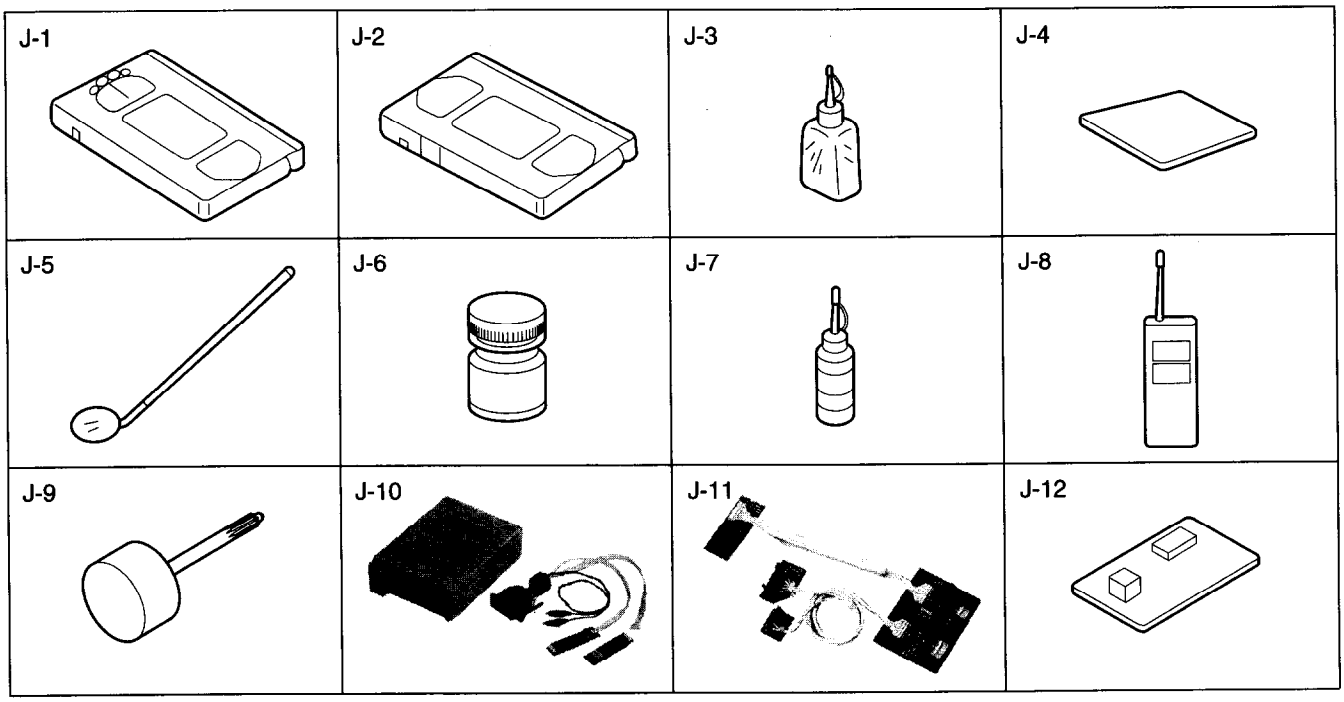


Fig. 2-2

2-6. HOW TO USE THE MODE SELECTOR II FOR ADJUSTING S TYPE MECHANISM ASSEMBLY

2-6-1. OUTLINE

To activate the VHS system S type mechanism assembly using mode selector II (J-6082-282-A), use connector conversion jig (J-6090-052-A) and the S type capstan board (J-6090-075-A). By using the connector conversion jig and the S type capstan board, the following operations are possible.

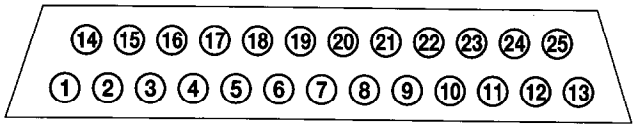
- Loading and unloading action by the loading motor.
- Normal and reverse rotation of the capstan motor.

2-6-2. PREPARATION

1) In order to drive the capstan motor, the power +5V and +12V are supplied from the Mode Selector II. Disassemble the D-SUB connector of the Mode Selector cable, then solder the following three places.

Supplied 3-pin cable	D-SUB connector of the Mode Selector II	Voltage
Pin 1 (Red index)	Pin 20	+12V
Pin 2	Pin 25	GND
Pin 3	Pin 24	+5V

- Connector pin number assignment of the D-SUB connector (From the soldering side)



- When connections are made, check that +5V and +12V are available at the 3-pin cable connector.

2) CHECKING THE SOFTWARE VERSION
Turn on the power of the Mode Selector II.
If the reading of the software version on the Mode Selector II is not 1.10 or higher, replace the new ROM (J-6082-314-A).

2-6-3. CONNECTION

1) S TYPE CAPSTAN BOARD ATTACHMENT
Replace the capstan board supplied with the connector conversion jig (J-6090-052-A) with the S type capstan board (J-6090-075-A).
2) CONNECTION BETWEEN THE CONNECTOR CONVERSION JIG AND THE MODE SELECTOR II.
Insert the connectors of the two 6-pin cables (one is white and the other is black) and the 3-pin cable from the Mode Selector II to the corresponding connectors on the connector conversion jig (J-6090-052-A).
3) CONNECTION BETWEEN THE CONNECTOR CONVERSION JIG AND THE S TYPE MECHANISM ASSEMBLY
With the power of the Mode Selector II turned off, insert the following two connectors to the corresponding connectors on the S type mechanism assembly.
  - 3-pin connector for the loading motor
  - 10-pin connector for the capstan motor

Set the speed control for the minimum setting (fully counterclockwise).

2-6-4. OPERATION

1) OPERATION OF THE LOADING MOTOR ON THE S TYPE MECHANISM ASSEMBLY
   ① Select the H type mechanism assembly setting on the Mode Selector II.
   ② Operating procedures after the mechanism selection
   For the operating procedures, see pages 3 to 5 of "8mm Video Mechanical Adjustment Manual IV (TK Mechanism) Supplement-1".
   For the loading procedure, see page 4 of "VHS Mechanical Adjustment manual IV (S Mechanism)".
2) OPERATION OF THE CAPSTAN MOTOR ON THE S TYPE MECHANISM ASSEMBLY
   ① By the loading motor operation under the item 1), change the mode setting to the FF/REW mode.
   ② Turn the speed control gradually in clockwise direction, then the capstan motor starts rotating. To turn the capstan motor in desired rotating direction, change the FF/REW setting of the rotating direction switch.

2-6-5. PRECAUTIONS

- Turn the speed control only when necessary. Otherwise, hold the speed control turned at fully counterclockwise direction. If the power of the Mode Selector II is turned on with the speed control turned in clockwise direction, +12V power fails and the power of the Mode Selector II cannot be turned on.
- Although the connector conversion jig (J-6090-052-A) has rubber feet, do not make a short circuit on the bottom surface of the connector conversion jig via peripheral conductive materials.

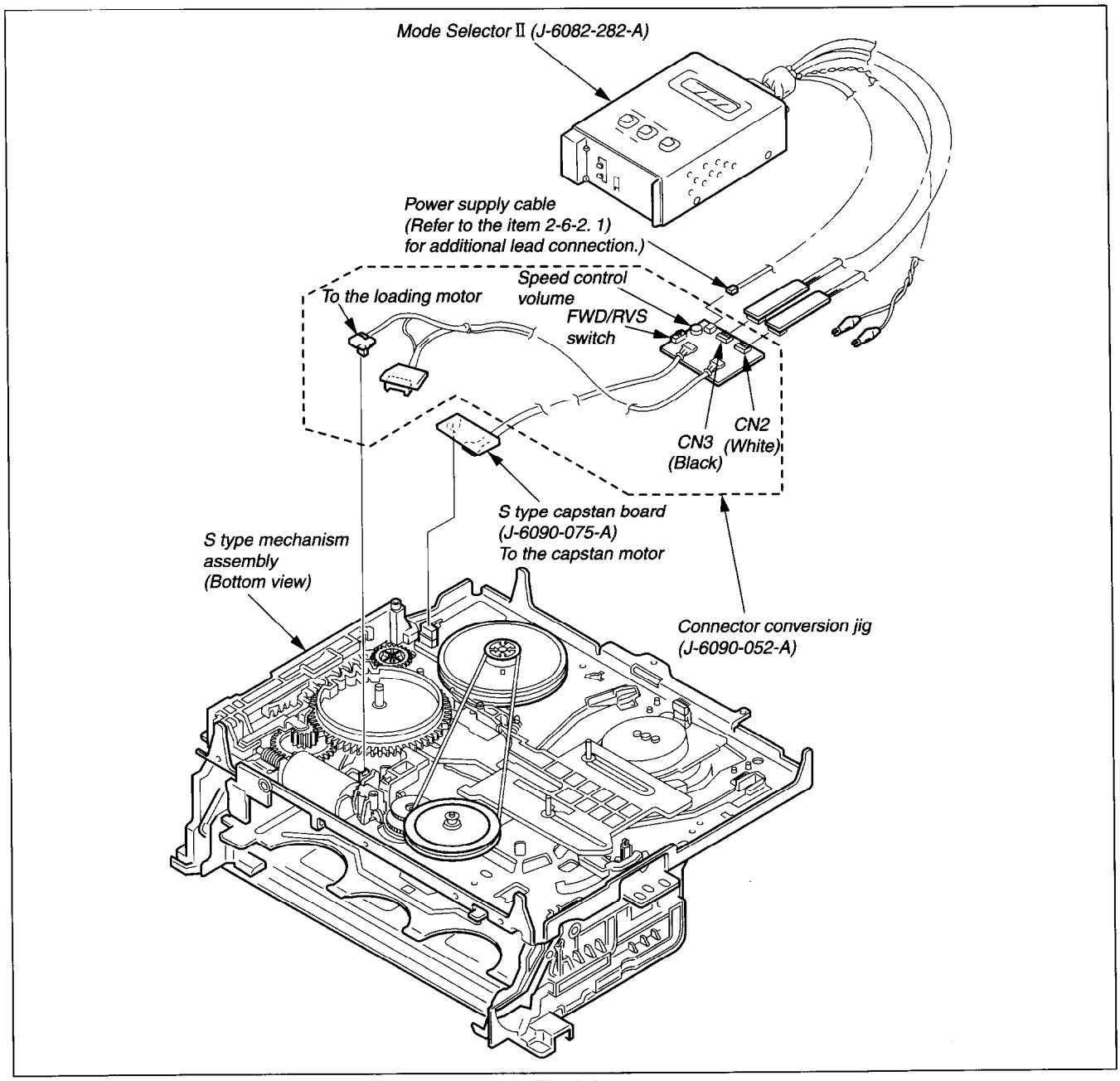


Fig. 2-3

2-6-6. CHECKING THE MECHANISM MODE BY THE MARK CARVED ON THE SLIDER

As shown in the right figure, the mechanism mode can be identified by checking the mark carved on the slider pointed by the loading gear shaft.

Carved mark	Mode
CD	Cassette down
EJ	Eject
UL	Unload end
LE	Load end
RV	Reverse
PR	Pinch release
FP	FWD pause
FW	FWD
ST	Stop
FR	FF/REW

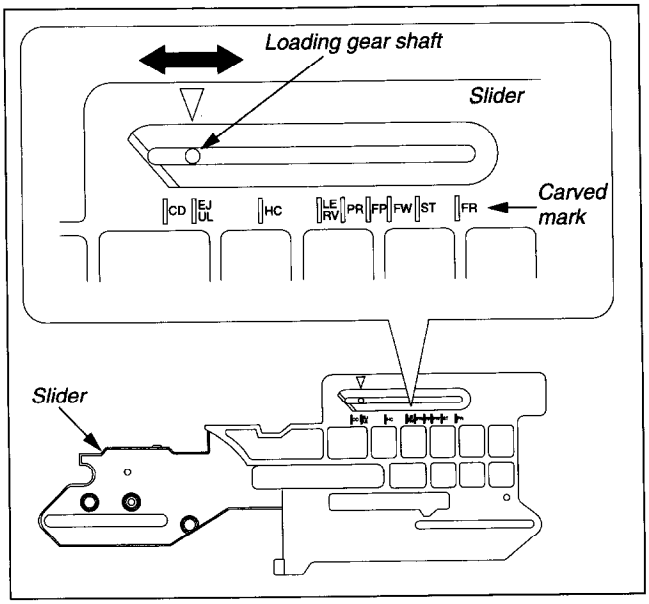


Fig. 2-4

2-7. PHASE ADJUSTMENT ON ATTACHING S TYPE MECHANISM ASSEMBLY

As shown below, adjust the phase between the rotary switch on the MA board and the cam gear.

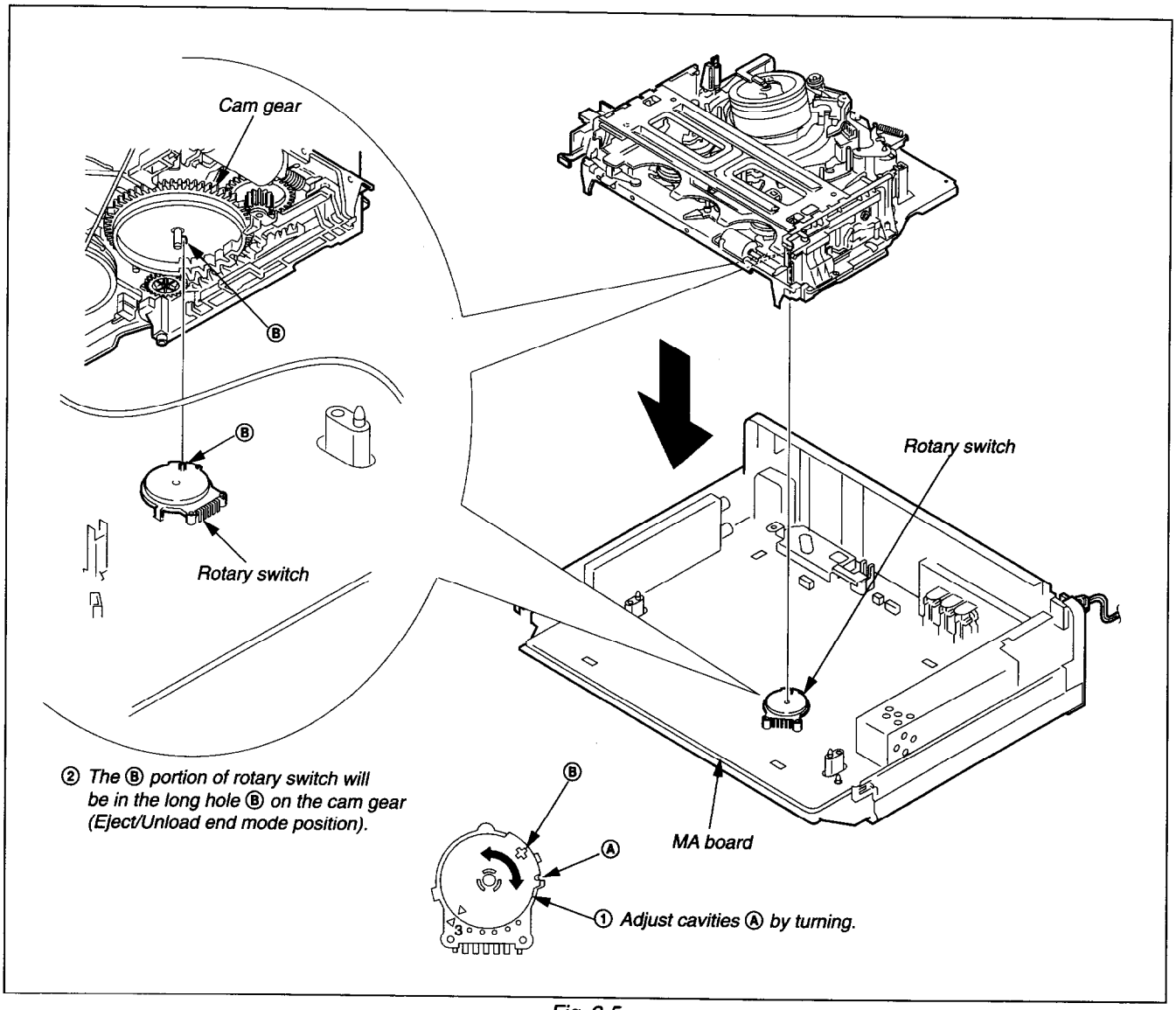

Cam gear
Ⓑ
Ⓑ
Rotary switch
Rotary switch
② The Ⓑ portion of rotary switch will be in the long hole Ⓑ on the cam gear (Eject/Unload end mode position).
Ⓑ
Ⓐ
① Adjust cavities Ⓐ by turning.
MA board

Fig. 2-5

3. MAINLY MECHANICAL PARTS REPLACEMENT

Notes:
For the removal of cabinets, printed circuit boards or the like, please refer to the "DISASSEMBLY" section on the service manual of the respective models.
To assemble the mechanical parts which are disassembled in the following sections, perform the disassembly steps in reverse, unless otherwise specified.
When replacing greased parts, grease them in the same way.
Do not oil, grease or touch with bare hands the surfaces that contacts tape of guides and brake shoes.
Install gears to engage each other.
Basically, disassembling and assembling should be done in the unthreading-end condition.

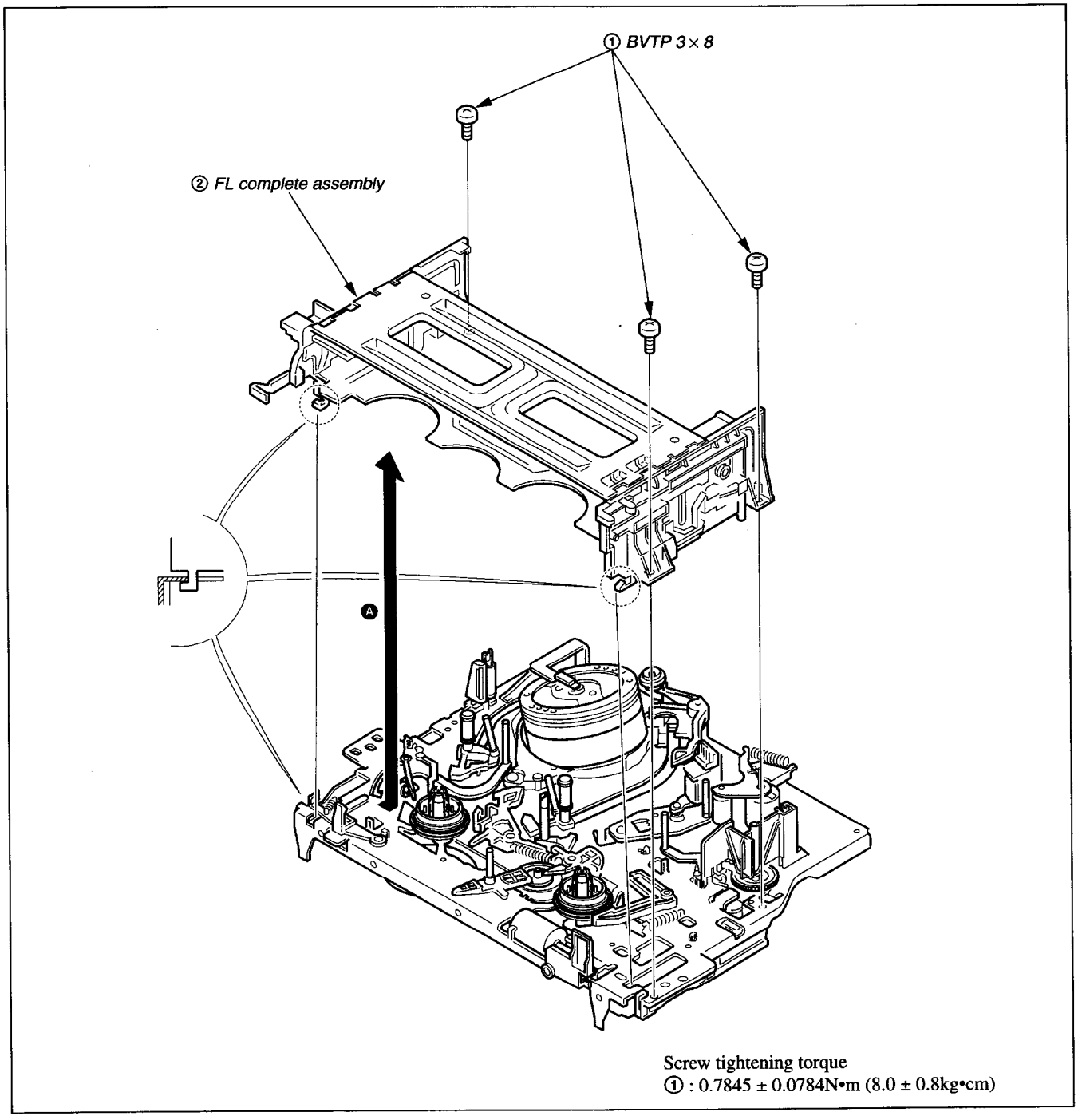
3-1. FL COMPLETE ASSEMBLY

1) Remove screws (BVTP3 × 8) ①.
2) Remove FL complete assembly ② in the arrow Ⓐ direction.

Note : Be careful not to damage claws on the bottom and front.

3) Remove torsion spring (deck open) ③.
4) Remove luminous plate (top sensor) ④ and luminous plate (end sensor) ⑤.

[Note on Mounting]
- When mounting FL complete assembly, first insert claws on the bottom and front not to damage.
- Keep clean top sensor and end sensor luminous plates.



Screw tightening torque
① : 0.7845 ± 0.0784N•m (8.0 ± 0.8kg•cm)

Fig. 3-1

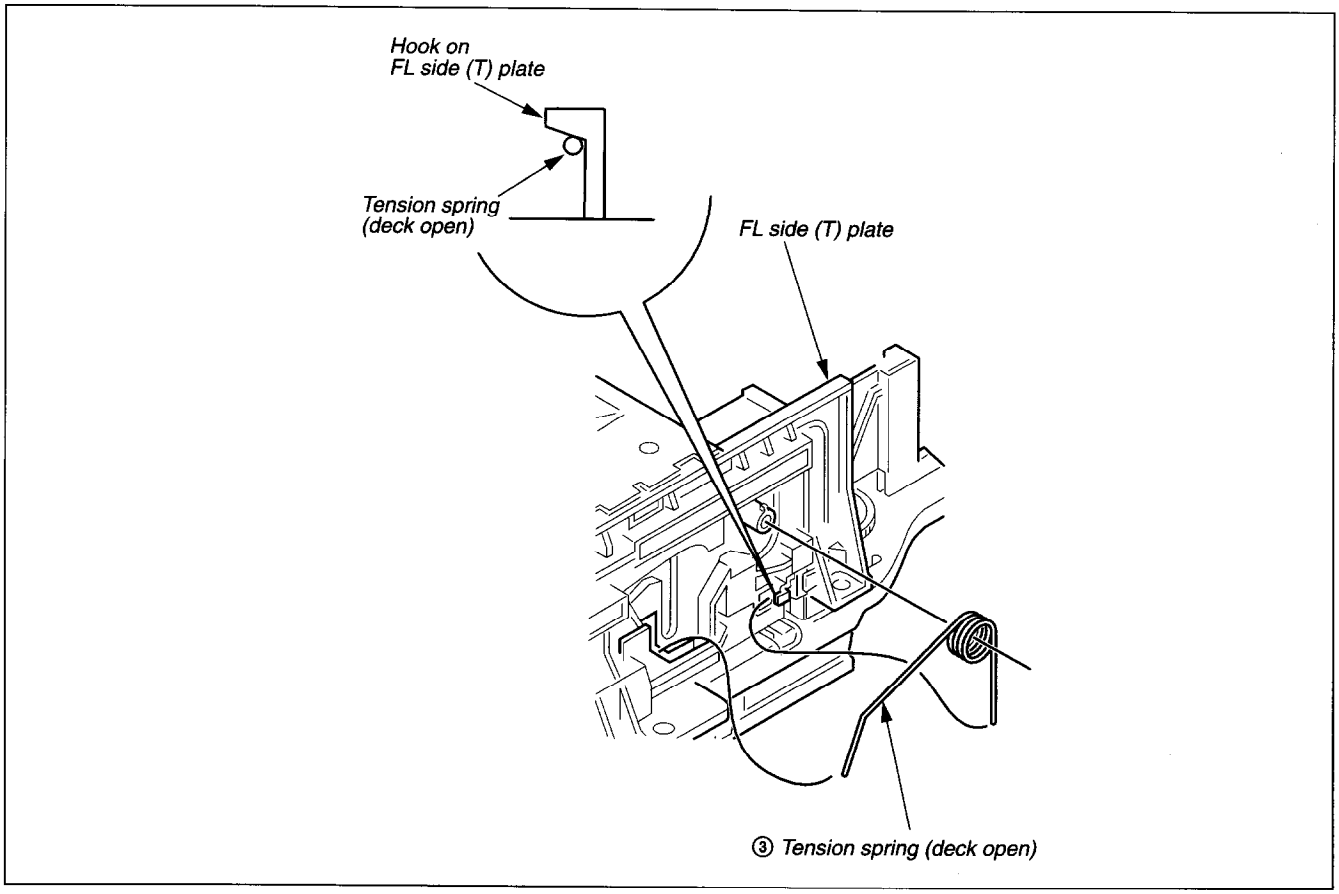

Hook on
FL side (T) plate
Tension spring
(deck open)
FL side (T) plate
③ Tension spring (deck open)

Fig. 3-2

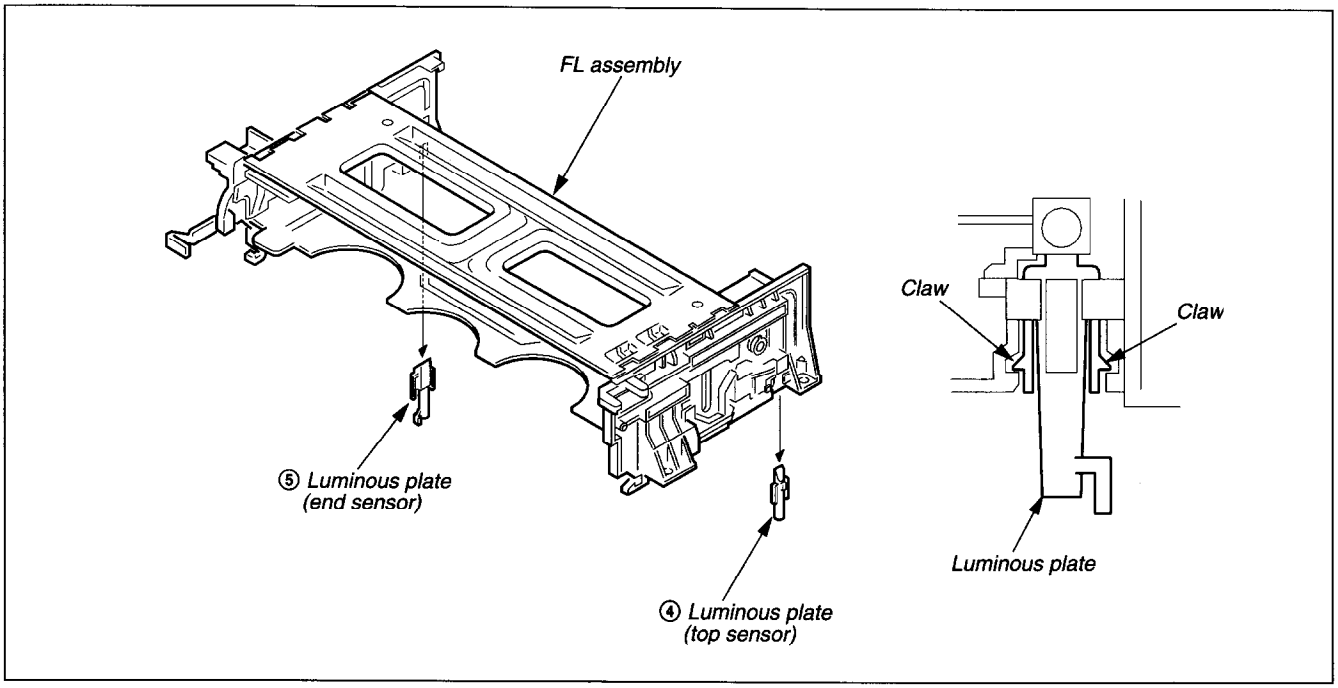

FL assembly
⑤ Luminous plate
(end sensor)
④ Luminous plate
(top sensor)
Claw
Claw
Luminous plate

Fig. 3-3

3-2. DRUM ASSEMBLY

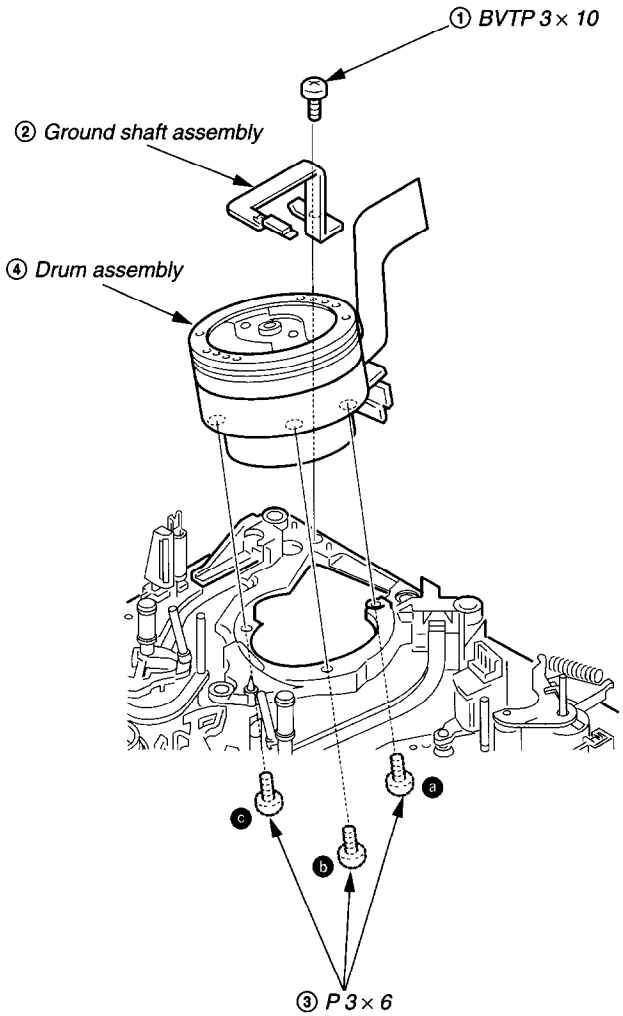
1) Remove screw (BVTP3 × 8) ①.
2) Remove ground shaft assembly ② not to touch its tip with bare hand.
3) Remove screws ③ to remove drum assembly ④.

[Notes on Mounting]

- Don't touch head chips and tip of ground shaft assembly with bare hand.
- Keep clean the surface that contacts tape of drum assembly.
- Tighten screw ③ in the order ⓐ, ⓑ, ⓒ.

[Adjusting after Mounting]

- 4-1. Tape path adjustment



Screw tightening torque
①, ③ : 0.4413 ± 0.0490N•m (4.5 ± 0.5kg•cm)

Fig. 3-4

3-3. PINCH PRESS BLOCK ASSEMBLY, TG8 ASSEMBLY AND THEIR PERIPHERY

1) Remove pinch press block assembly ① while releasing its tip from the claw of lid opener ②.
2) Remove lid opener ② while releasing claw in the arrow Ⓐ direction from mechanical chassis.
3) Remove elevator gear ③.
4) Remove TG8 assembly ④, TG8 arm gear ⑤ and TG8 arm driving gear ⑥.
5) Then remove pinch pressing gear ⑦.

[Notes on Mounting]

- When attaching pinch pressing gear ⑦ and elevator gear ③, be sure to adjust their phases as shown in Fig. A.
- Apply grease to elevator gear ⑦ and pinch shaft as shown in Fig. B.
- Don't touch surface of pinch roller with bare hand.

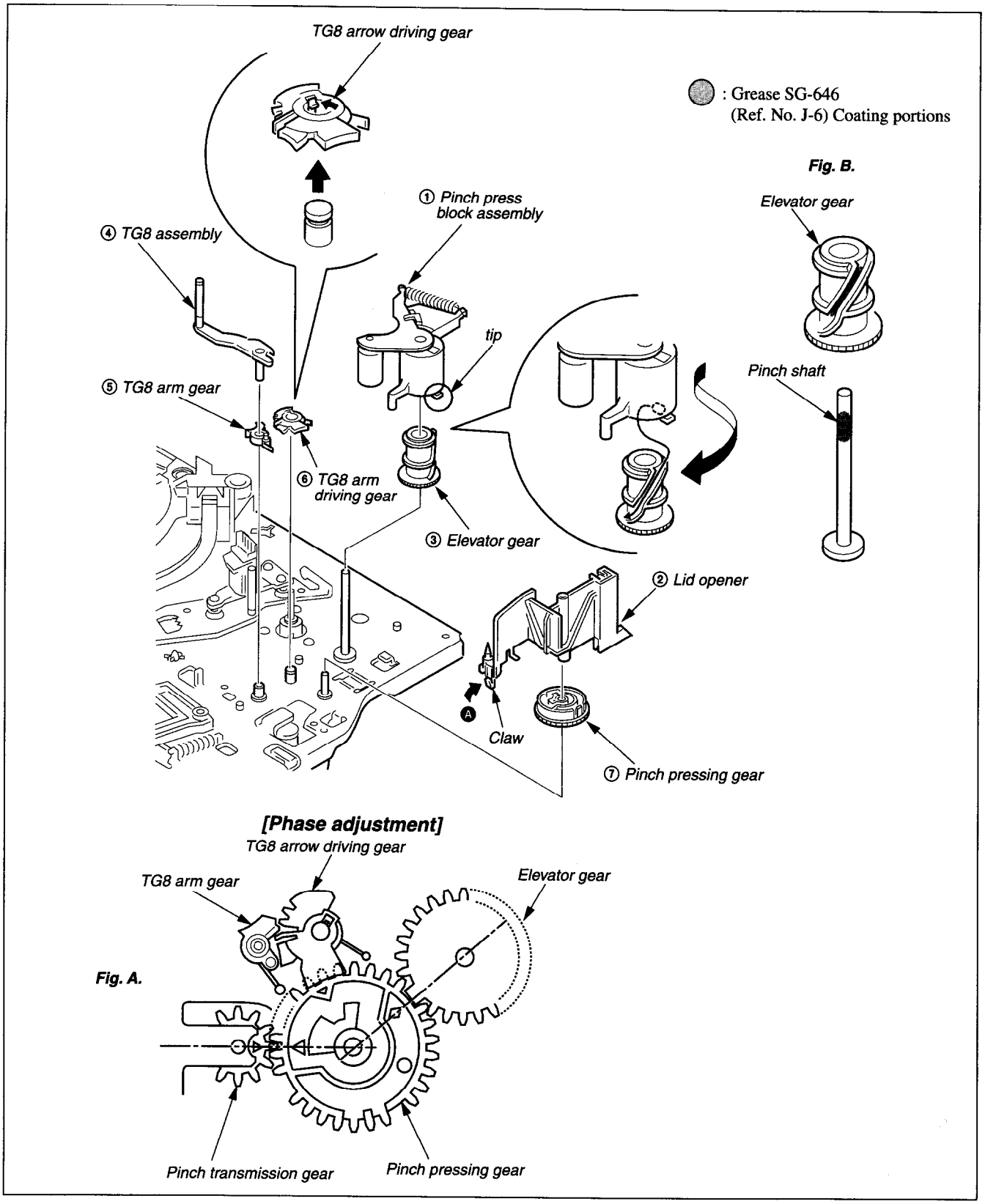


Fig. 3-5

3-4. RUBBER BELT, CAPSTAN MOTOR

1) Remove rubber belt ①.
2) Remove screws ② to pull out capstan motor ③.

[Notes on Mounting]

- Attach rubber belt not to twist it.
- Don't touch capstan motor with bare hand to keep clean capstan motor.
- Tighten screws ② in the order ⓐ, ⓑ, ⓒ.

[Adjustment after Mounting]

- 4-1. Tape path adjustment.

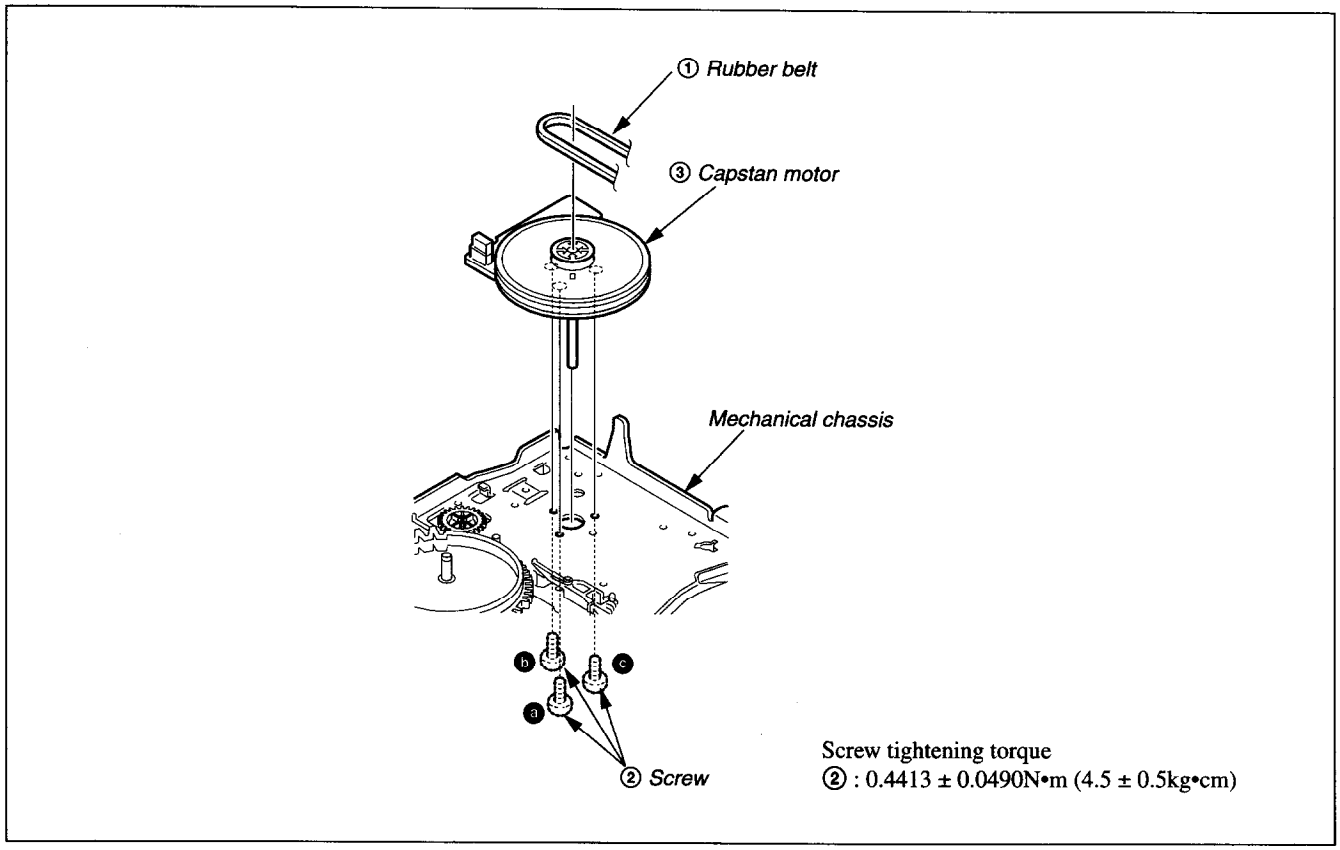


Fig. 3-6

3-5. ACE HEAD BLOCK ASSEMBLY

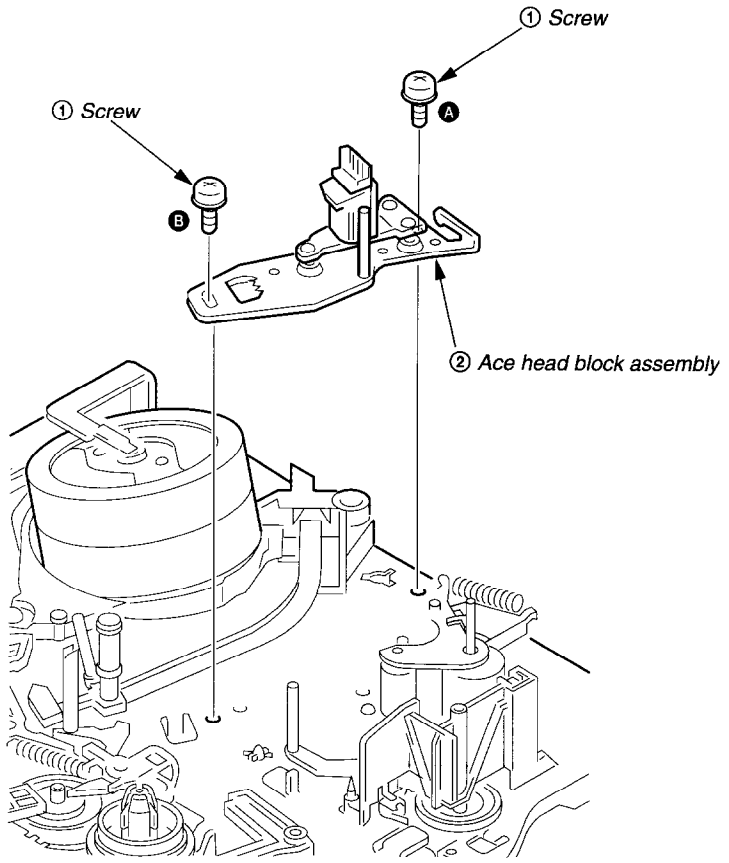
1) Remove screws ① to remove ACE head block assembly ②.

[Notes on Mounting]

- Don't touch capstan motor with bare hand to keep clean capstan motor.
- On tightening screws ①, first, tighten in the order Ⓐ, Ⓑ, next loosen Ⓑ 180 degrees or more and perform adjustments. After adjustments tighten with torque screwdriver (torque; 0.29 ± 0.29 N•m (3.0 ± 0.3kg•cm)).

[Adjustment after Mounting]

- 4-1. Tape path adjustment.



Screw tightening torque
① : 0.7845 ± 0.0784N•m (8.0 ± 0.8kg•cm)

Fig. 3-7

3-6. FEH ASSEMBLY

1) While putting the boss out from mechanical chassis, turn FEH assembly ① in the arrow Ⓐ direction and pull out FEH assembly above.
2) Slide FE head ② out from FEH holder not to break claw (Recorder only).
3) Remove TG2 shaft ③ by pushing with a screwdriver covered with cloth or the like not to scratch the surface.

[Note on Mounting]

• Don't touch FE head and TG2 shaft with bare hand.

[Adjustment after Mounting]

• 4-1. Tape path adjustment.

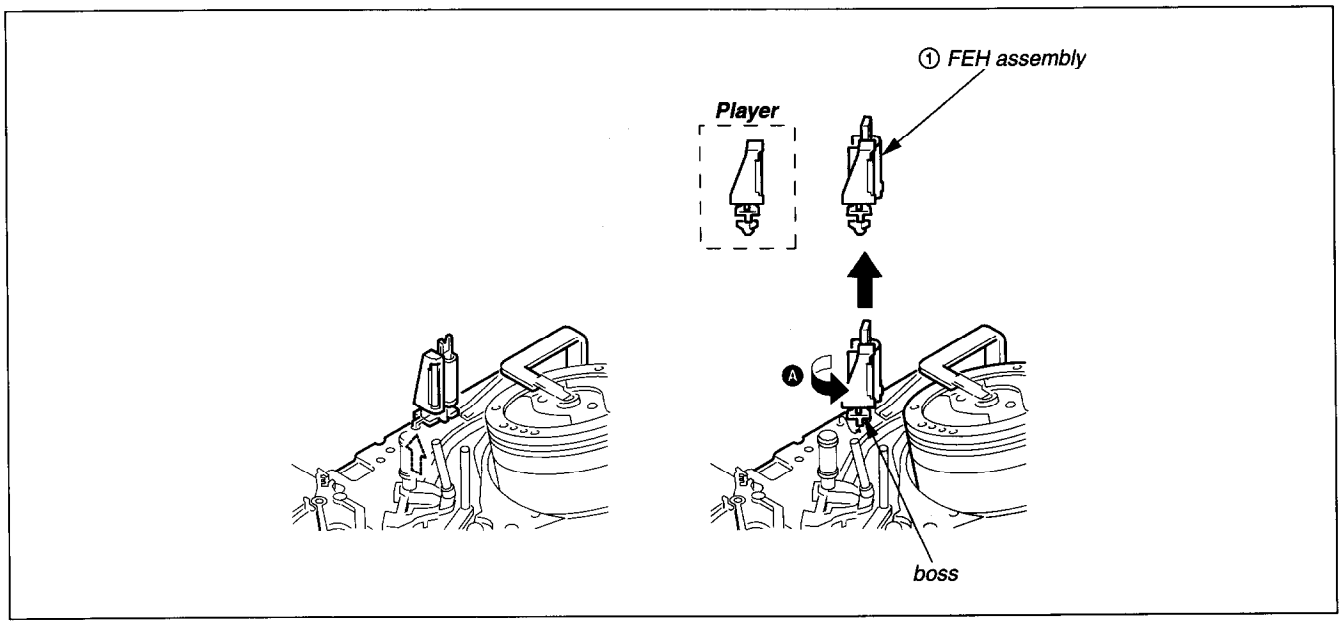


Fig. 3-8

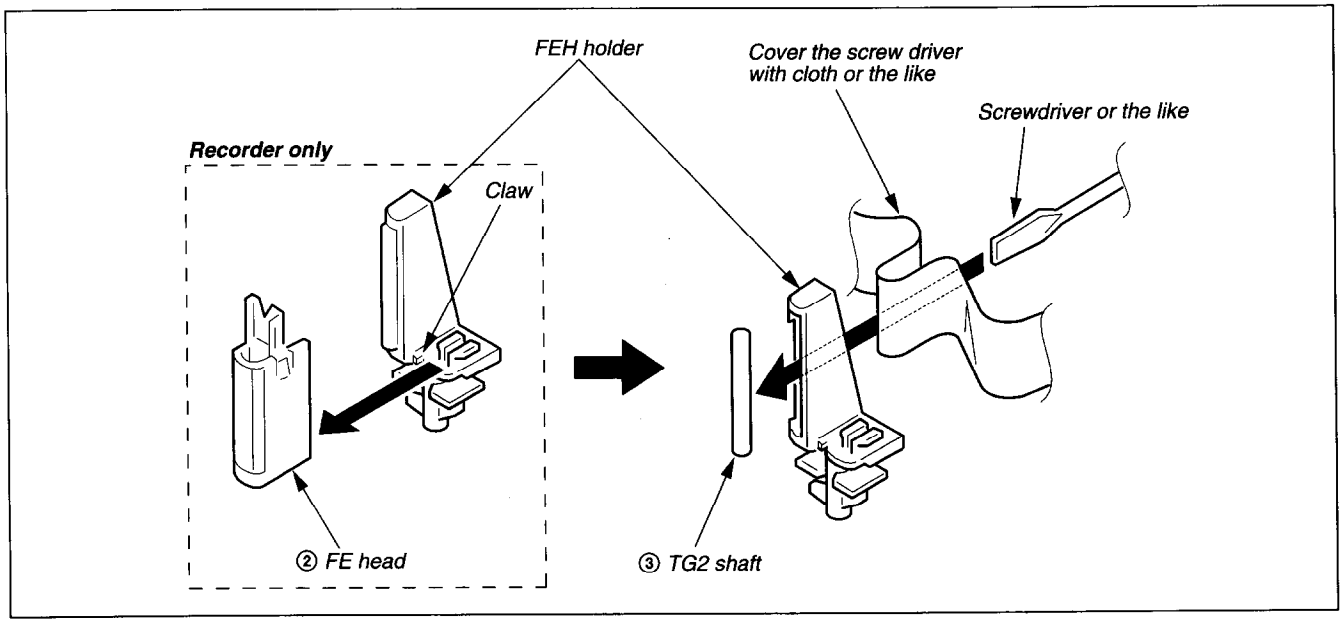


Fig. 3-9

3-7. REC PROOF LEVER

1) Remove FL complete assembly. (Refer to 3-1.)
2) Remove tension spring (REC proof) ①.
3) Remove REC proof lever ② in the arrow Ⓑ by pushing claw in the arrow Ⓐ direction.

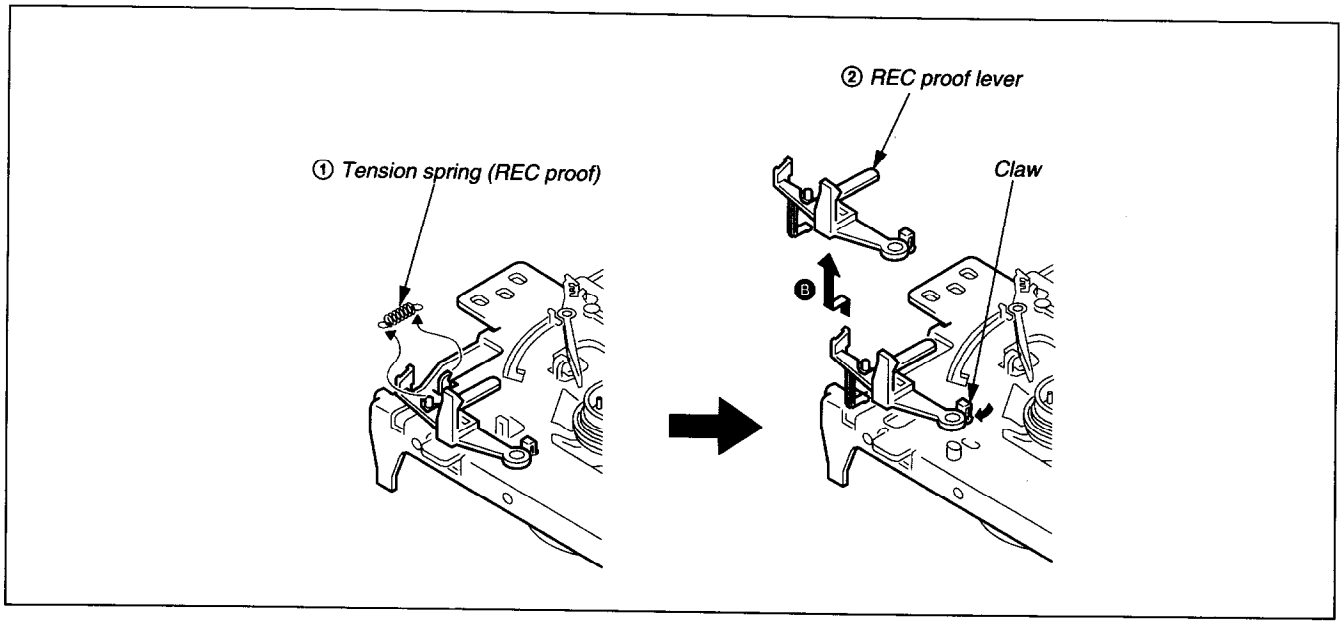


Fig. 3-10

3-8. RVS BRAKE ARM ASSEMBLY

1) Remove FL complete assembly. (Refer to 3-1.)
2) Remove extension spring (RVS brake) ①.
3) Turn RVS brake arm assembly ② in the arrow Ⓐ direction and remove it in the arrow Ⓑ.

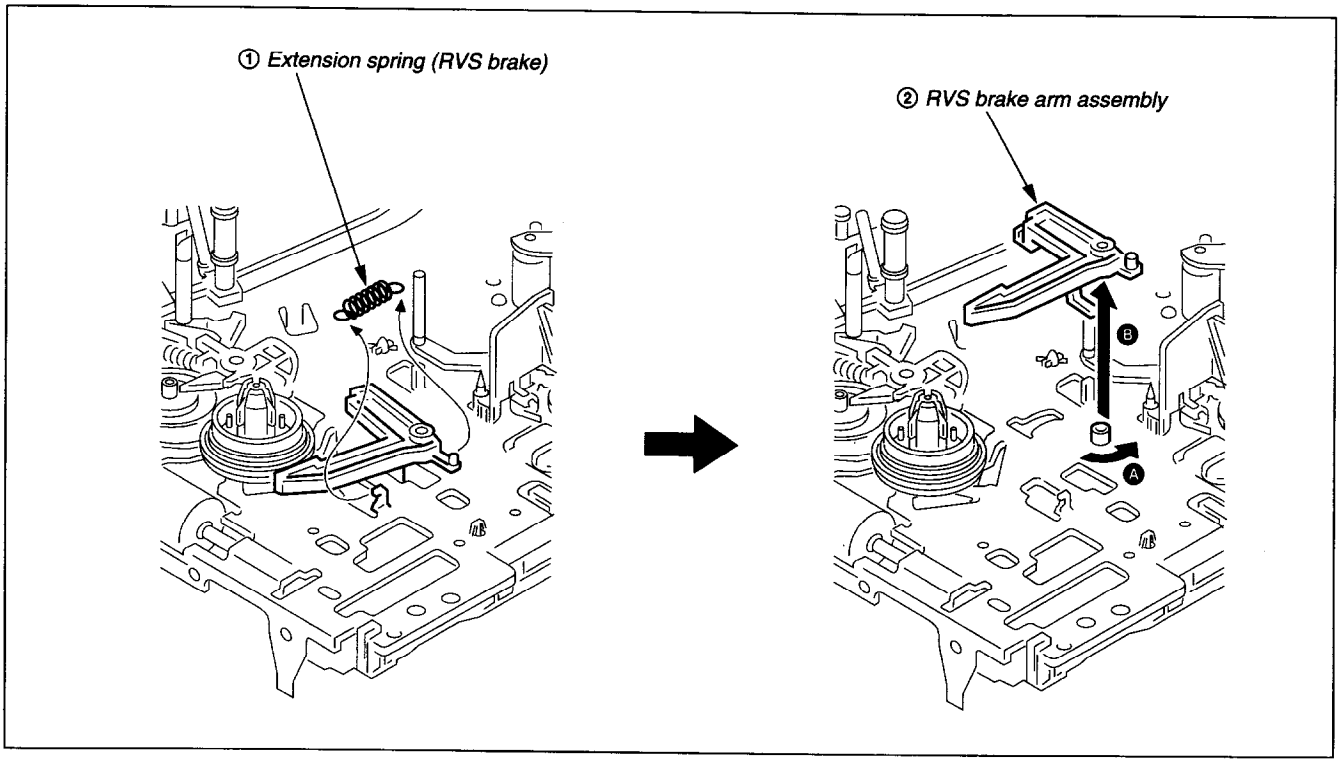


Fig. 3-11

3-9. MAIN (S) AND MAIN (T) BRAKE ASSEMBLIES

1) Remove FL complete assembly. (Refer to 3-1.)
2) Remove extension spring (main brake) ①.
3) Turn main (S) brake assembly ② in the arrow Ⓐ direction and remove it in the arrow Ⓑ.
4) Turn main (T) brake assembly ③ in the arrow Ⓒ direction and remove it in the arrow Ⓓ.

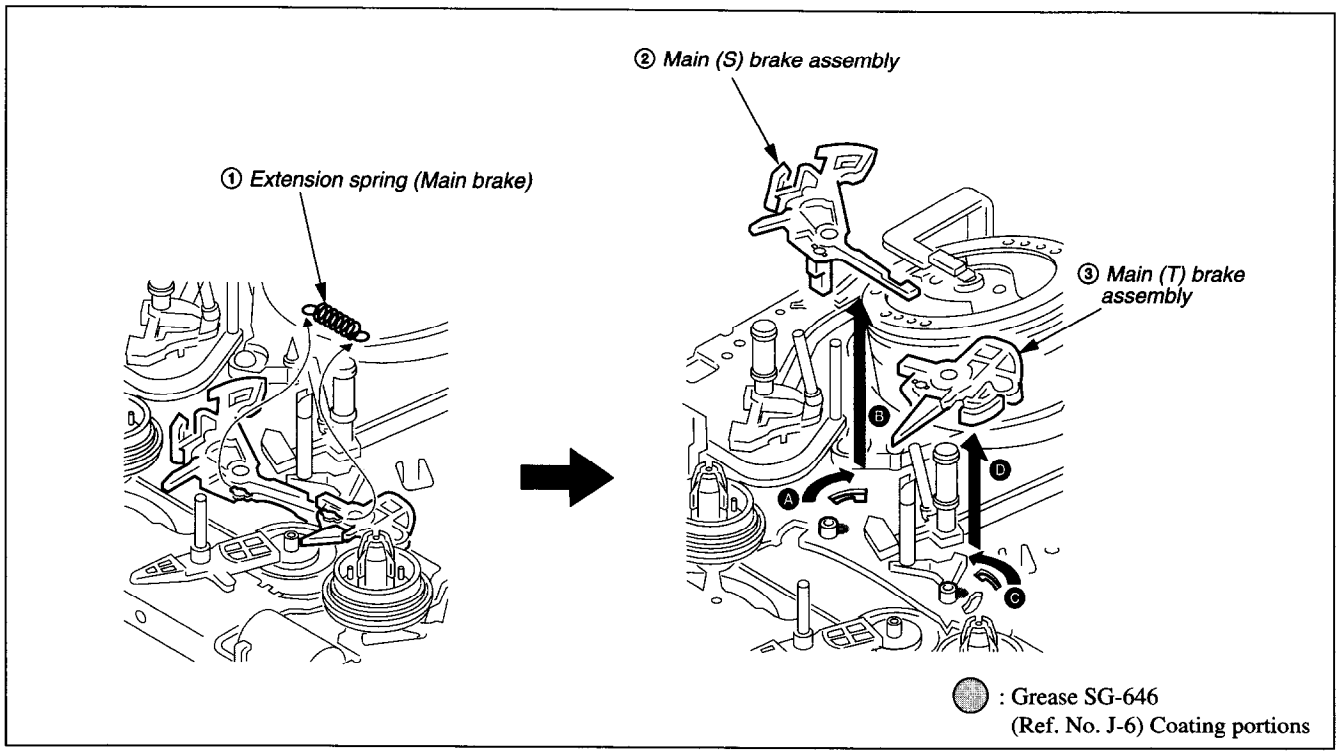


Fig. 3-12

3-10. REEL (T) TABLE (BLACK)

1) Remove FL complete assembly. (Refer to 3-1.)
2) Remove stopper washer ① to pull reel (T) table ② out.
3) Remove thrust washer ③.

[Note on Mounting]

• Before attaching, confirm the oil is applied at the top of reel (T) shaft.

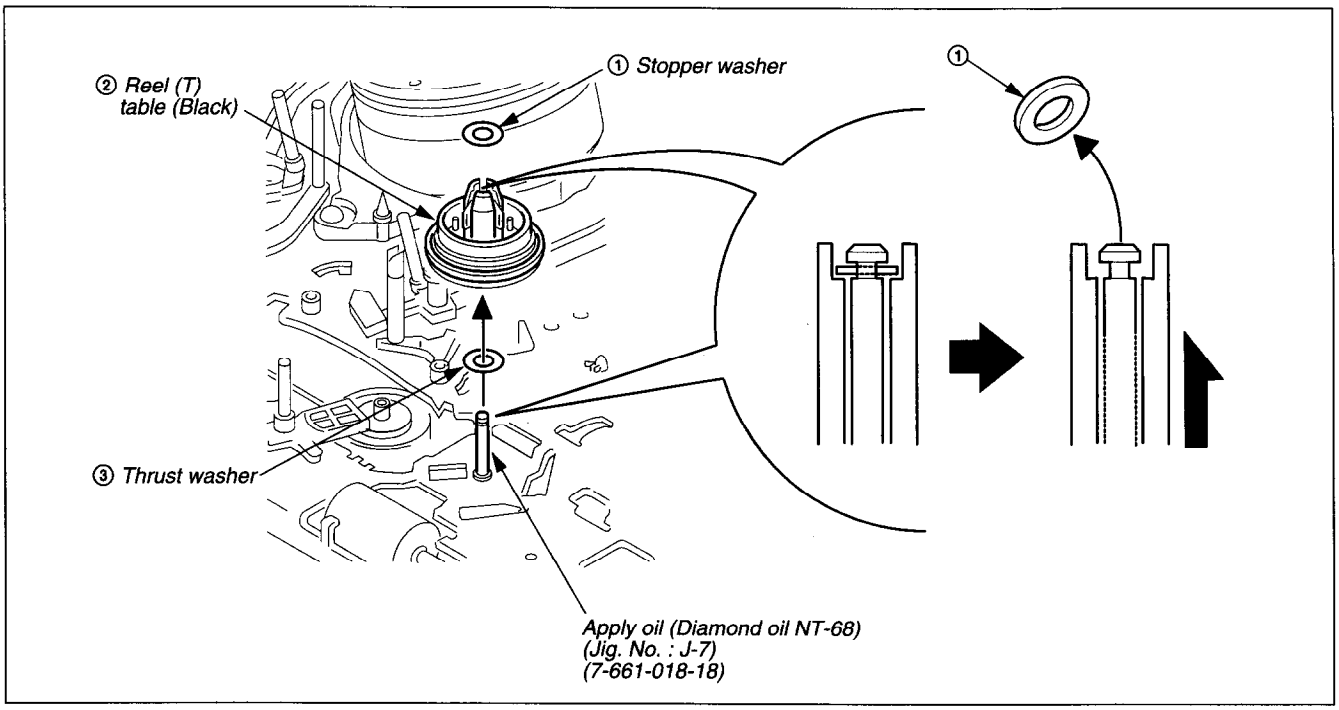


Fig. 3-13

3-11. PENDULUM ARM ASSEMBLY

1) Remove FL complete assembly. (Refer to 3-1.)
2) Remove main (S) and main (T) brake assemblies. (Refer to 3-9.)
3) While releasing claws from the pendulum arm shaft in the arrow A direction, pull out pendulum arm assembly ①.

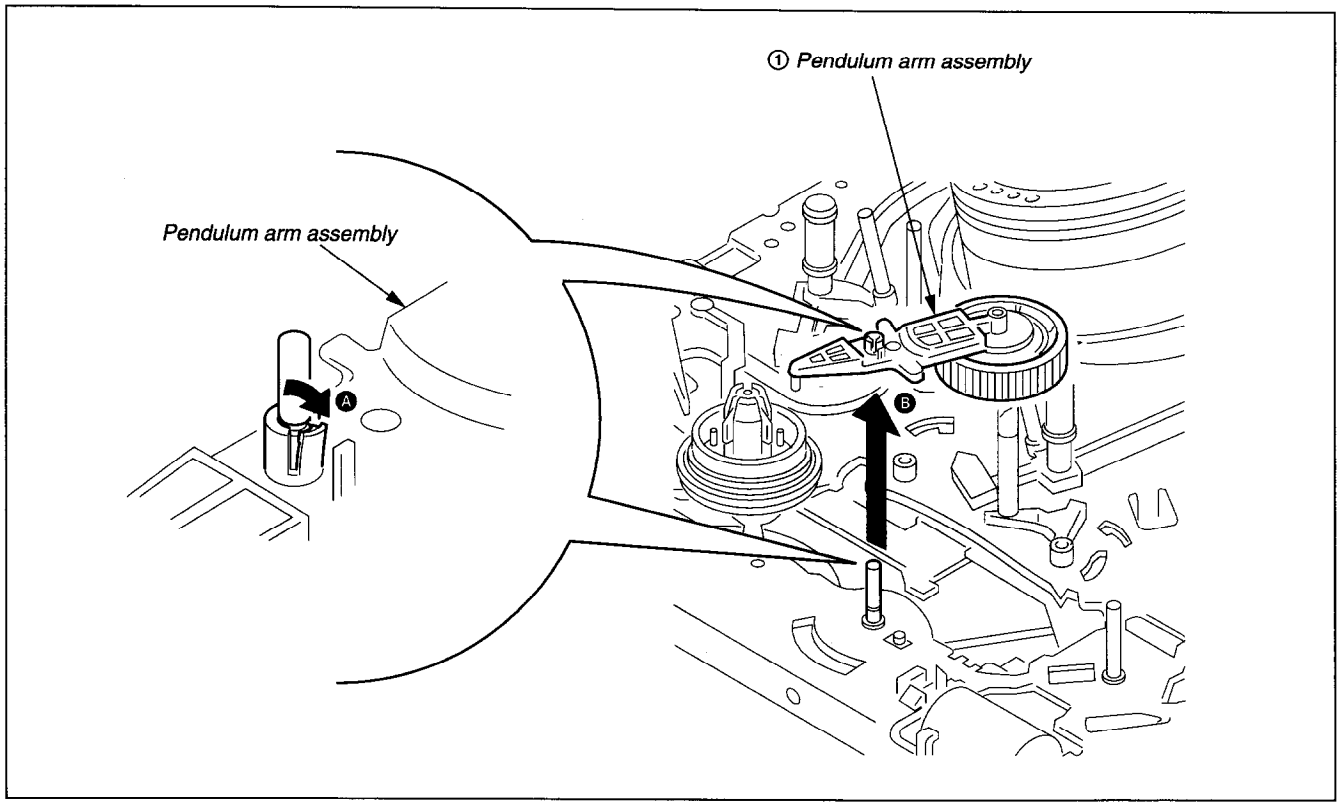


Fig. 3-14

3-12. FL SLIDER BLOCK ASSEMBLY

1) Remove FL complete assembly. (Refer to 3-1.)
2) Set the mechanism deck upside down.
3) Remove a screw (BVTP 3 × 8) ① and then retainer plate ② is getting out of place.
4) Slide FL slider block assembly ③ off in the arrow Ⓐ direction and raise it up.

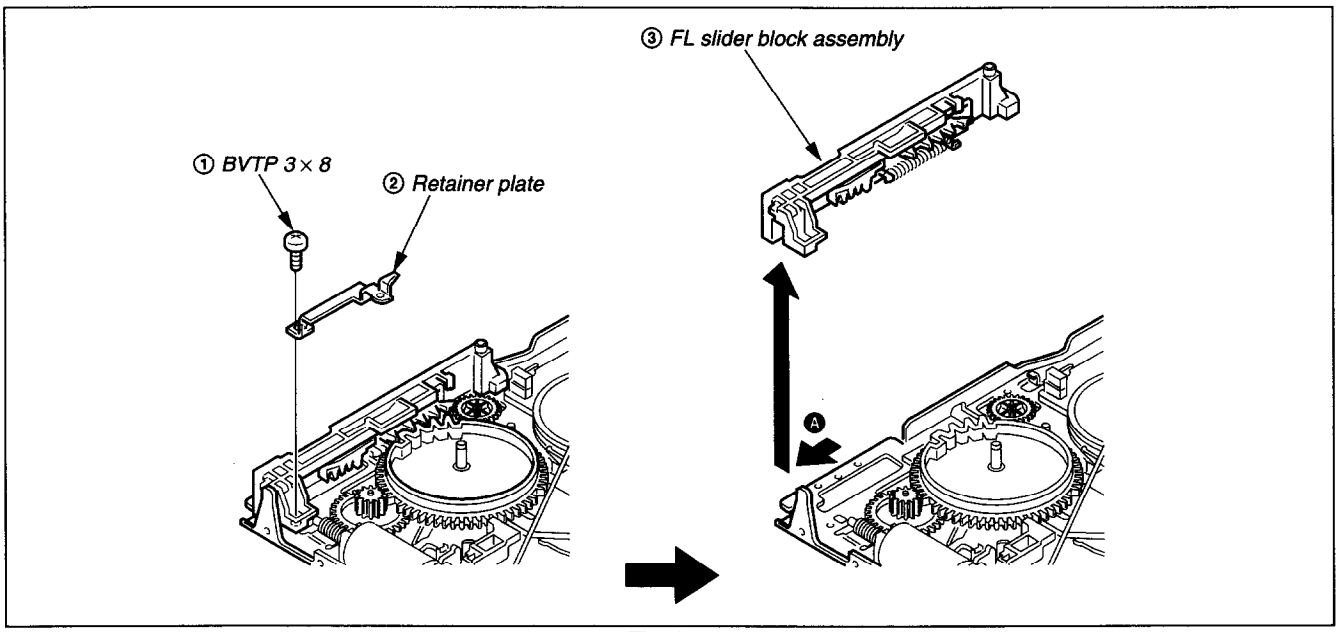


Fig. 3-15

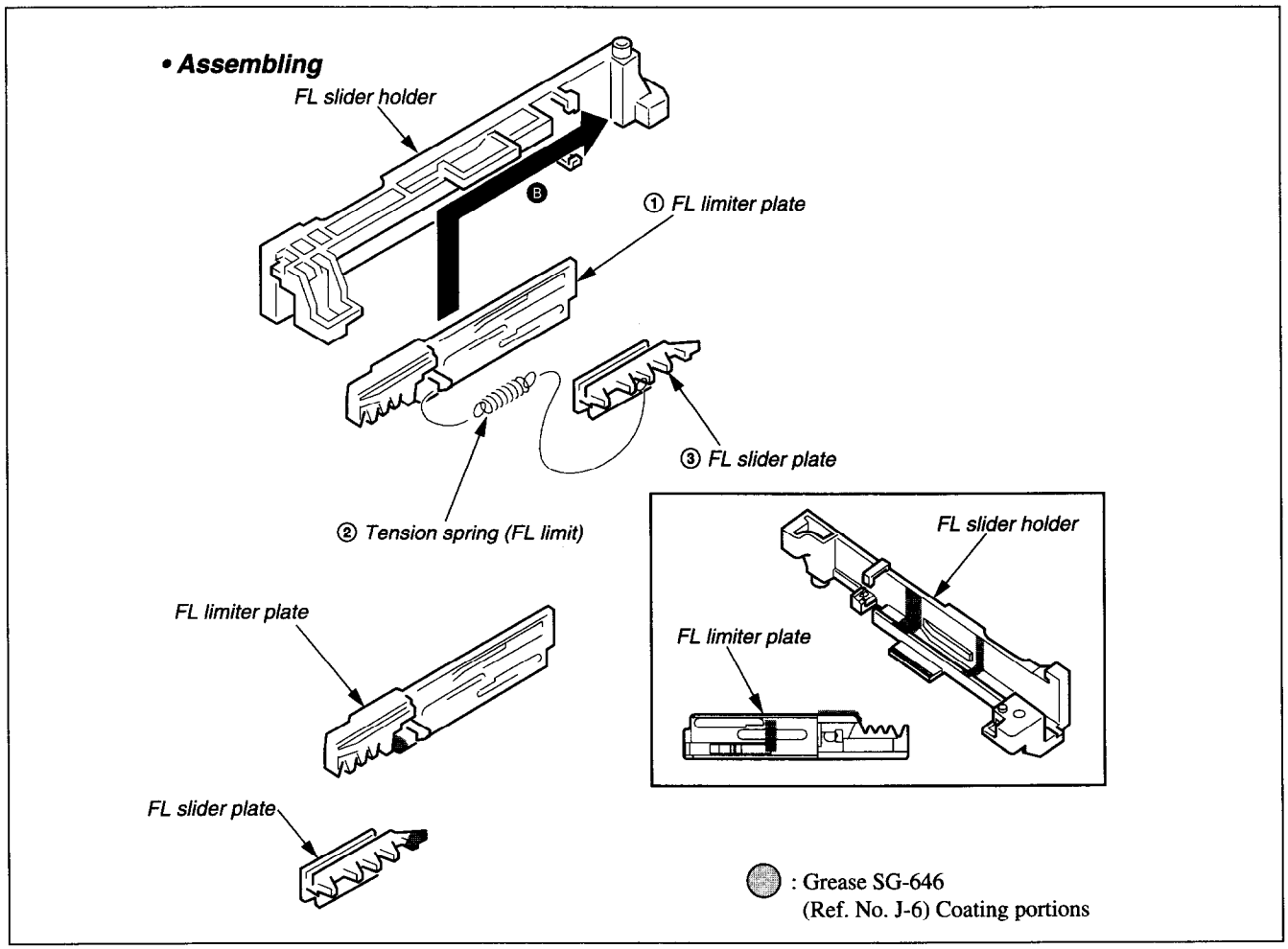


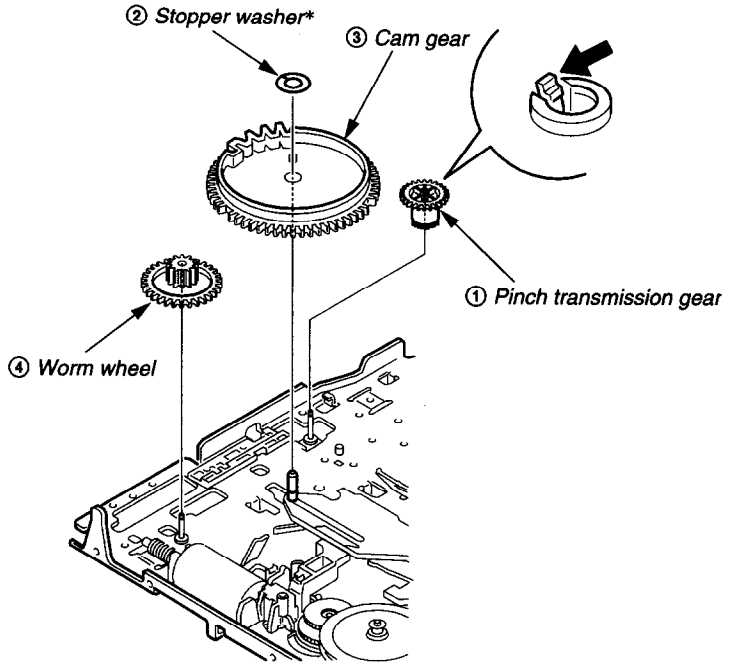
Fig. 3-16

3-13. PINCH TRANSMISSION GEAR, CAM GEAR, WORM WHEEL

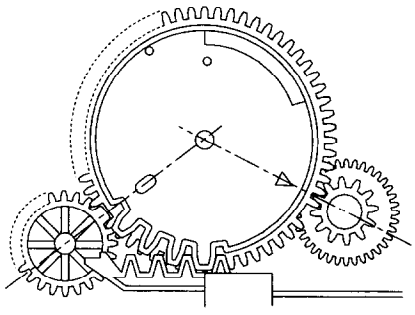
1) Remove FL complete assembly. (Refer to 3-1.)
2) Remove FL slider block assembly. (Refer to 3-12.)
3) Remove pinch transmission gear ① by putting off its claw from shaft.
4) Remove stopper washer ②* to pull out cam gear ③.
5) Remove worm wheel ④ by putting off its claw from shaft.

[Note on Mounting]

- Before attaching cam gear ③, confirm that the specified locations are coated with grease SG-646 (Ref. No. J-6).
- Adjust the phase of gears each other.

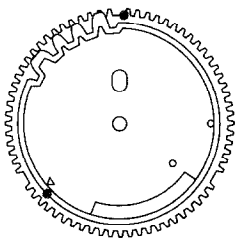


• Phase adjustment

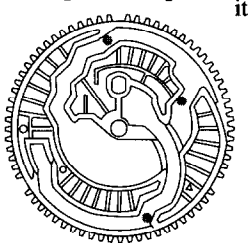


: Grease SG-646 (Ref. No. J-6) Coating portions

[Top]



[Bottom]



* Once remove stopper washer ②, don't use it again. Replace it with new one.

Fig. 3-17

3-14. CAPSTAN BRAKE ASSEMBLY, CAPSTAN BRAKE SHAFT

1) Remove rubber belt. (Refer to 3-4.)
2) Remove cap brake spring ①.
3) Remove capstan brake assembly ② by putting off claw of capstan brake shaft ③.
4) Set the mechanical chassis bottom side down.
5) While pushing the boss of capstan brake shaft ③, turn it clockwise to remove it.

[Note on Mounting]

• Don't touch shoe of capstan brake assembly with bare hand.

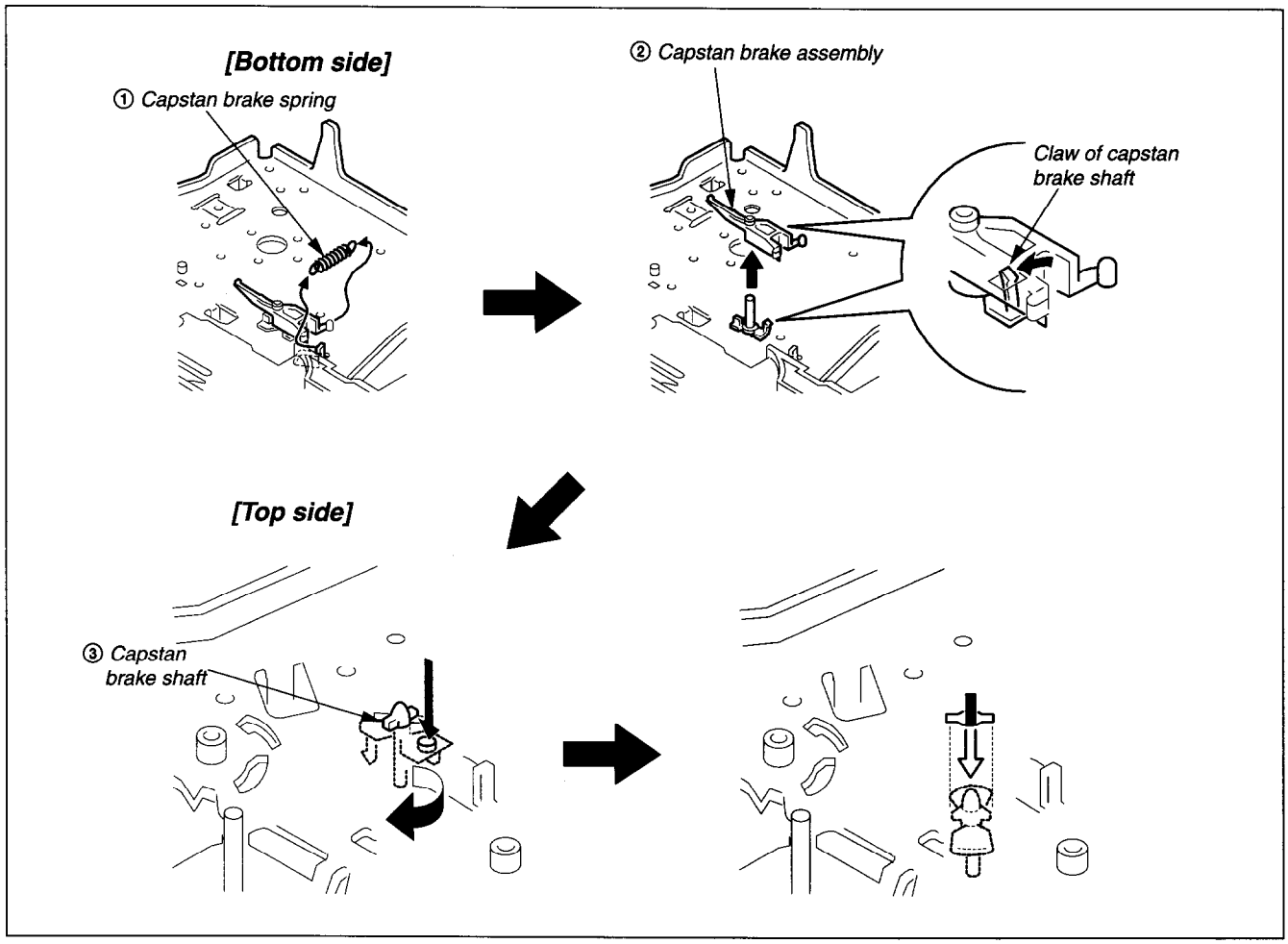


Fig. 3-18

3-15. FL SLIDER GUIDE

1) Remove FL complete assembly. (Refer to 3-1.)
2) Remove FL slider block assembly. (Refer to 3-12.)
3) Remove FL slider guide ① while pushing claws in the arrow Ⓐ direction.

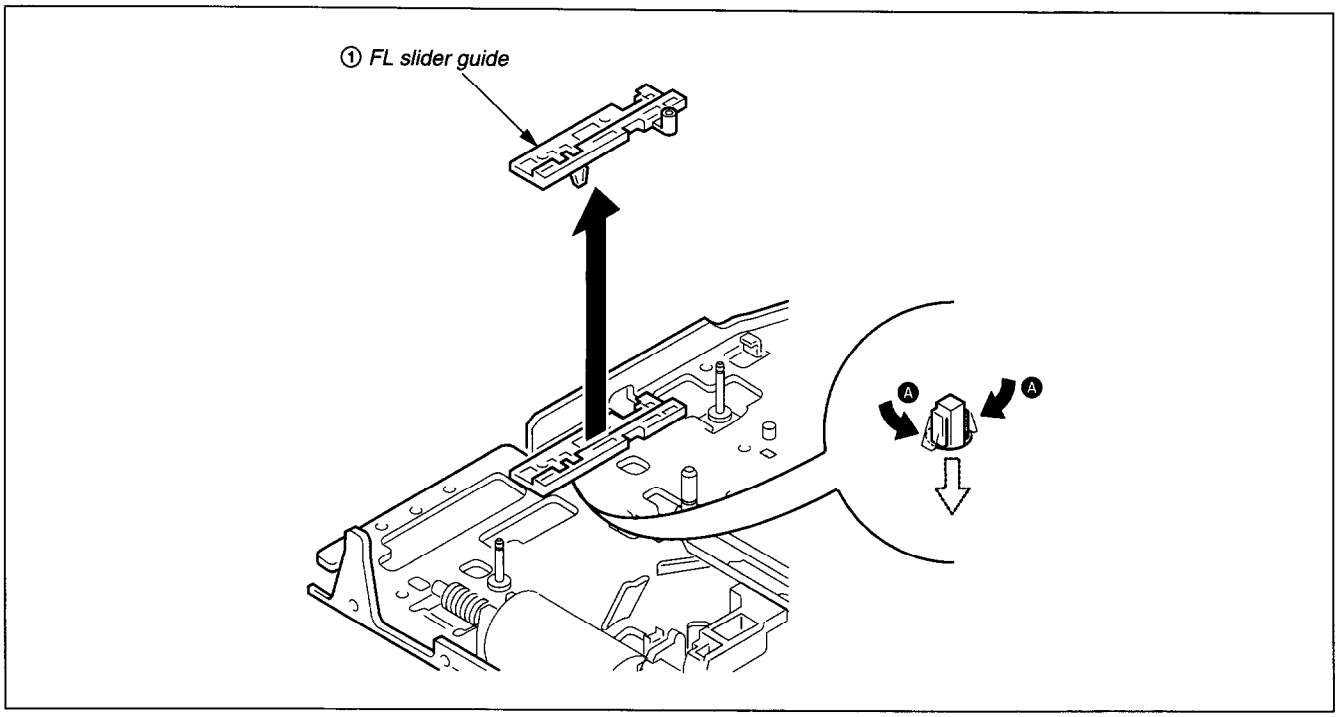


Fig. 3-19

3-16. SLIDER

1) Remove FL complete assembly. (Refer to 3-1.)
2) Remove rubber belt. (Refer to 3-4.)
3) Remove FL slider block assembly. (Refer to 3-12.)
4) Remove cam gear. (Refer to 3-13.)
5) Remove stopper washers ① and remove slider ② in the arrow direction.

[Note on Mounting]

- Before attaching slider ②, confirm the specified locations are coated with grease SG-646 (Ref. No. J-6).
- When attaching slider ②, adjust "Δ" mark on slider to loading gear (T) shaft as shown in Fig. A.

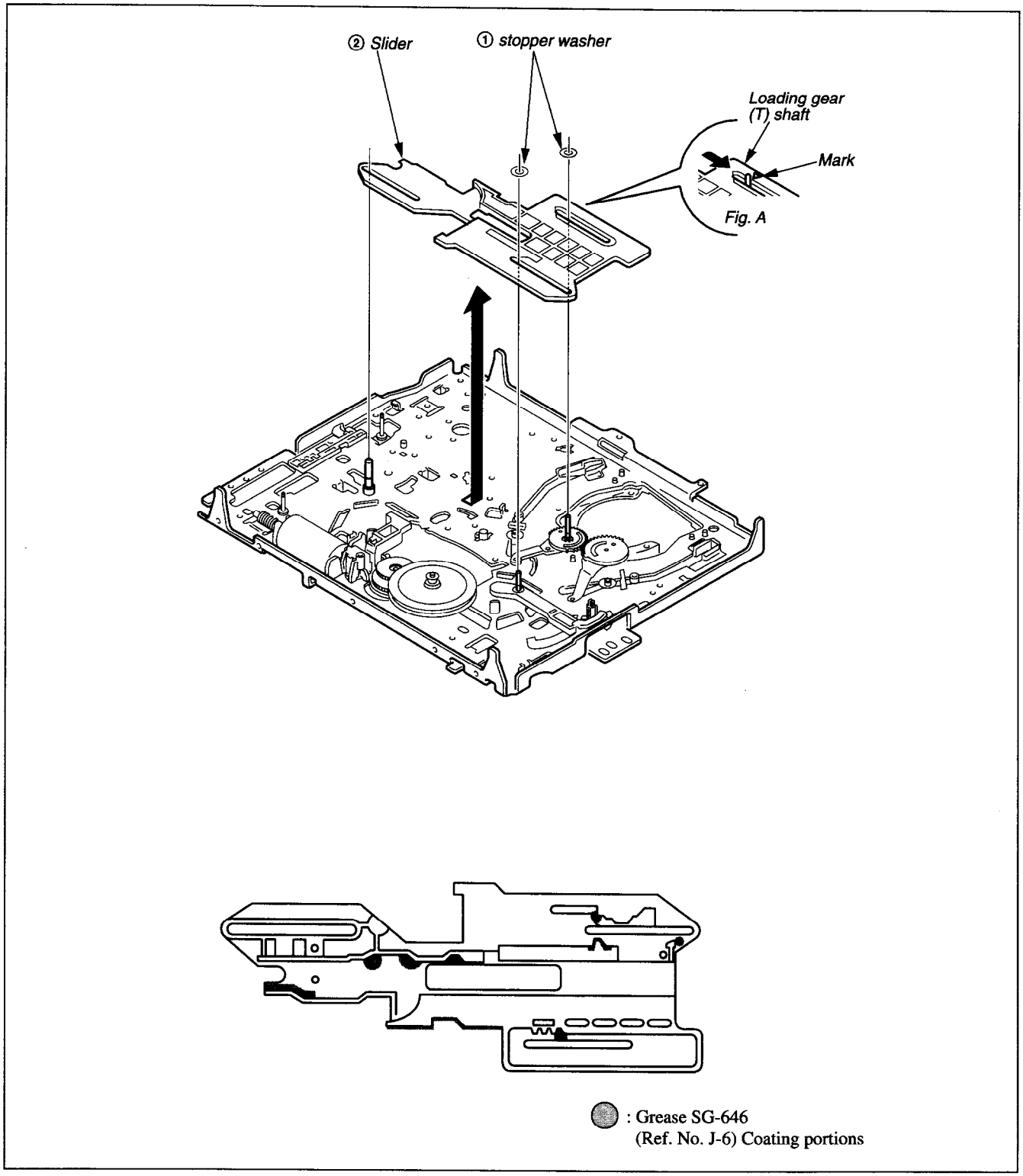


Fig. 3-20

3-17. TG1 DRIVING ARM

1) Remove FL complete assembly. (Refer to 3-1.)
2) Remove rubber belt. (Refer to 3-4.)
3) Remove FL slider block assembly. (Refer to 3-12.)
4) Remove cam gear. (Refer to 3-13.)
5) Remove slider. (Refer to 3-16.)
6) Remove spring (power tension) ① from TG1 driving arm ②.
7) Remove TG1 driving arm ② by turning it in the arrow Ⓐ to Ⓑ direction.

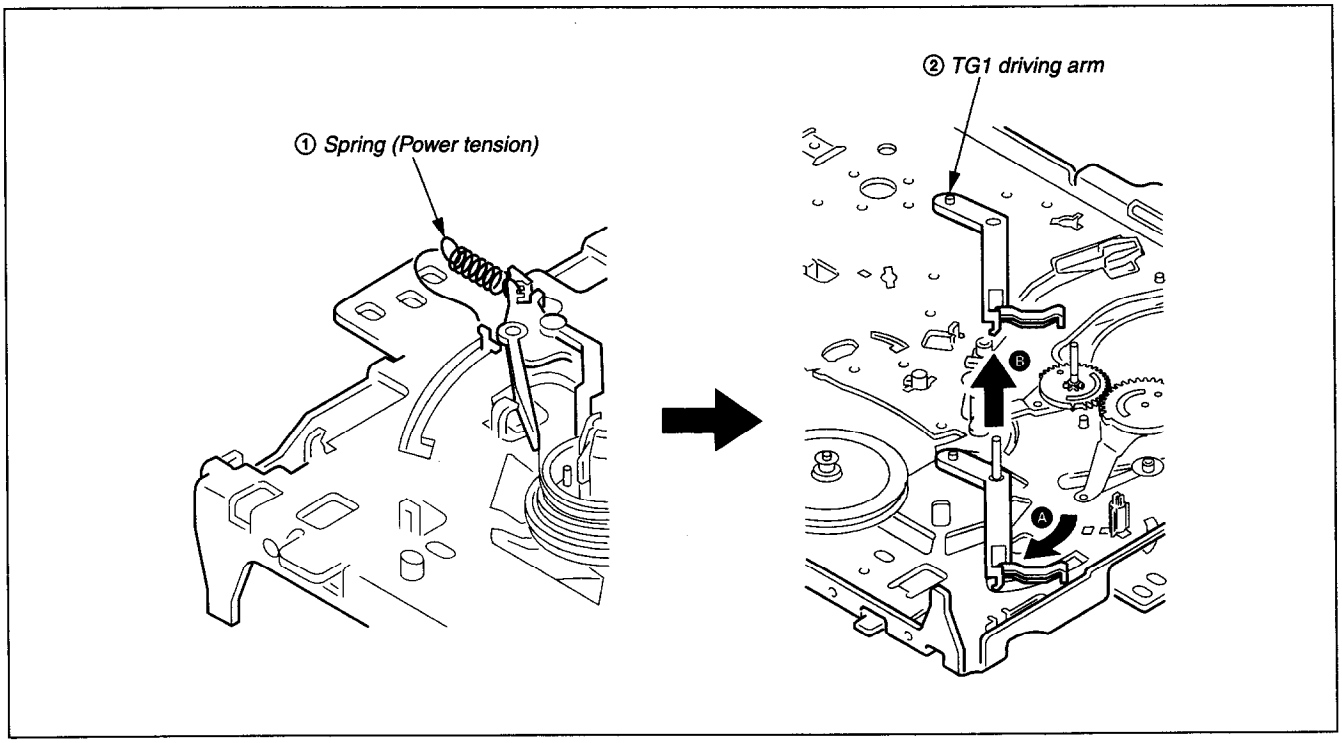


Fig. 3-21

3-18. LOADING (T) AND LOADING (S) GEAR ASSEMBLIES

1) Remove FL complete assembly. (Refer to 3-1.)
2) Remove rubber belt. (Refer to 3-4.)
3) Remove FL slider block assembly. (Refer to 3-12.)
4) Remove cam gear. (Refer to 3-13.)
5) Remove slider. (Refer to 3-16.)
6) Remove loading (T) gear assembly ① and loading (S) gear assembly ② in the arrow direction.

[Note on Mounting]

• When attaching them, be sure to adjust the phase each other.

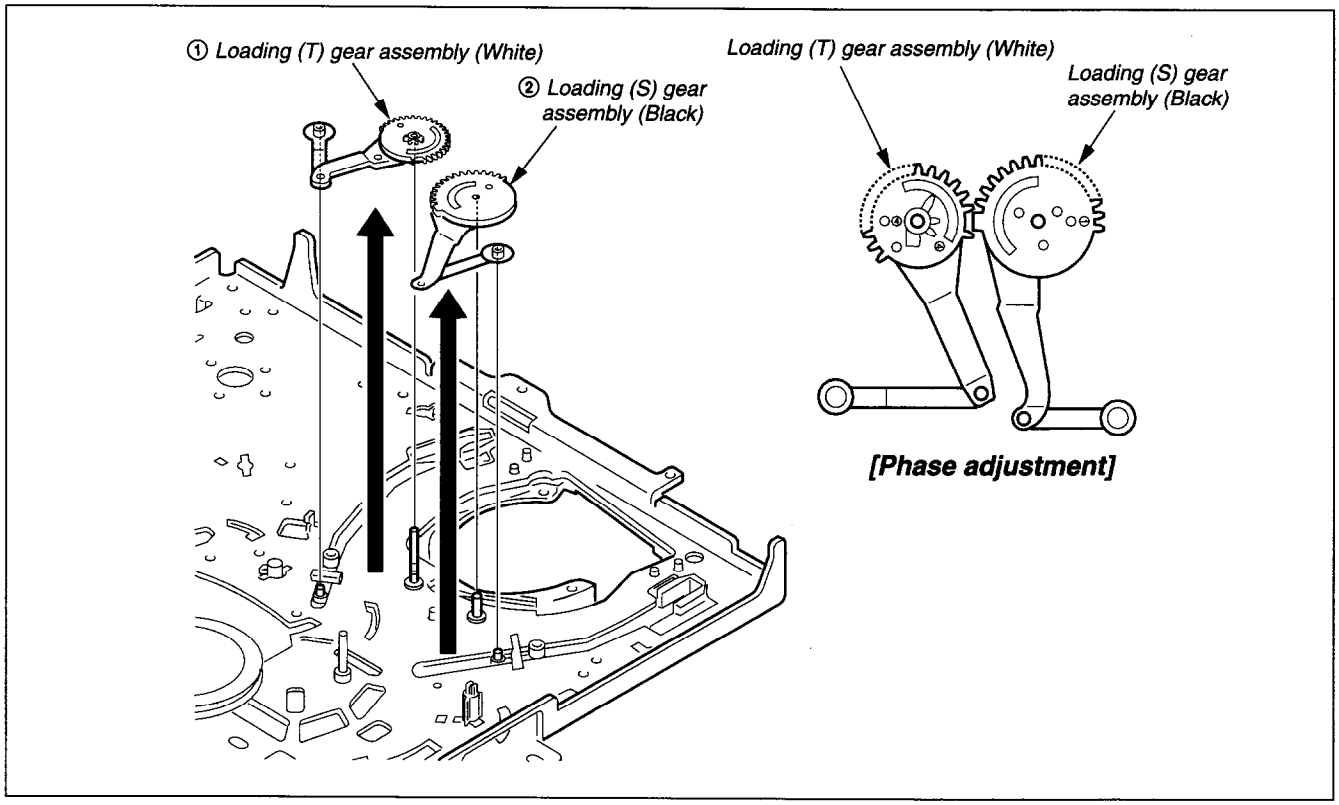

① Loading (T) gear assembly (White)
② Loading (S) gear assembly (Black)
Loading (T) gear assembly (White)
Loading (S) gear assembly (Black)
[Phase adjustment]

Fig. 3-22

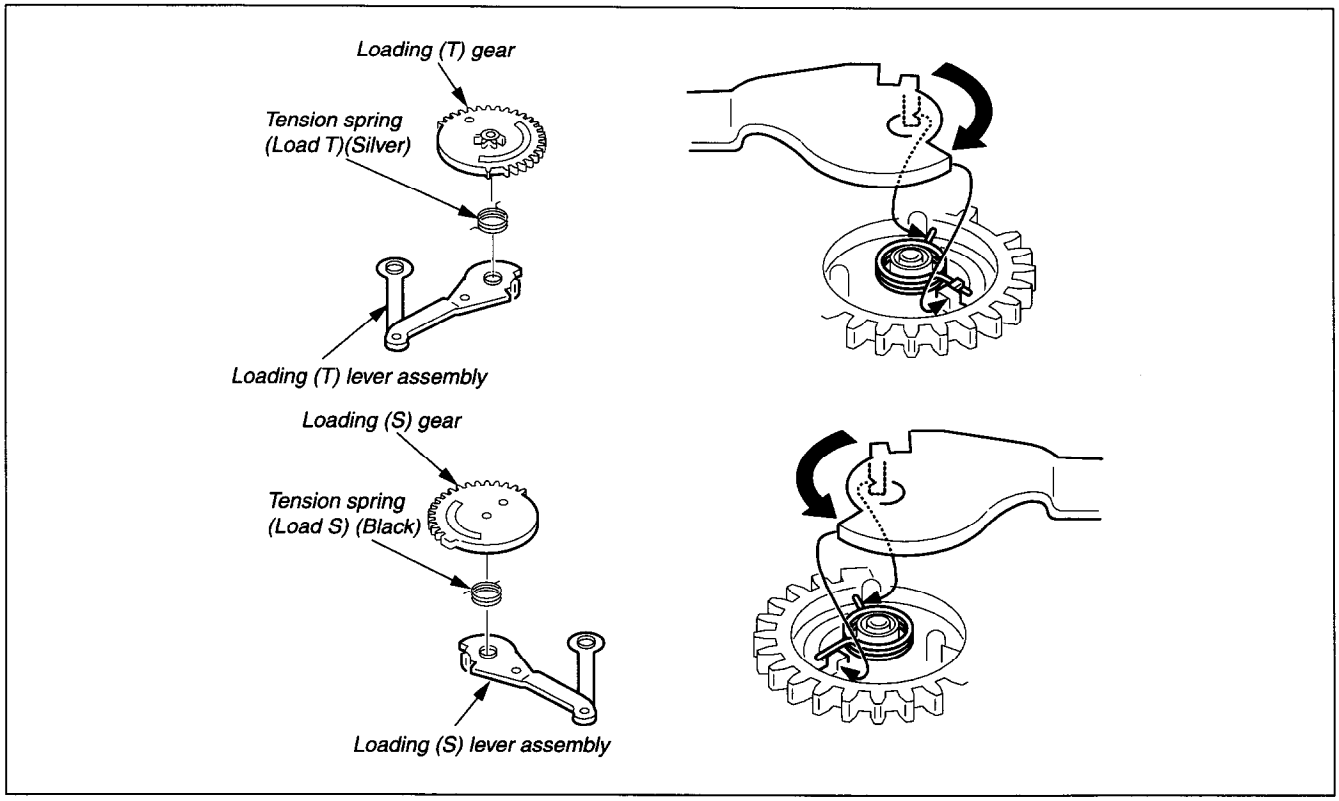


Fig. 3-23

3-19. PULLEY GEAR ASSEMBLY, CLUTCH GEAR

1) Remove rubber belt. (Refer to 3-4.)
2) Remove stopper washer ①.
3) Remove pulley gear assembly ② with clutch gear ③.

[Note on Mounting]
• When attaching them, don't insert strongly.

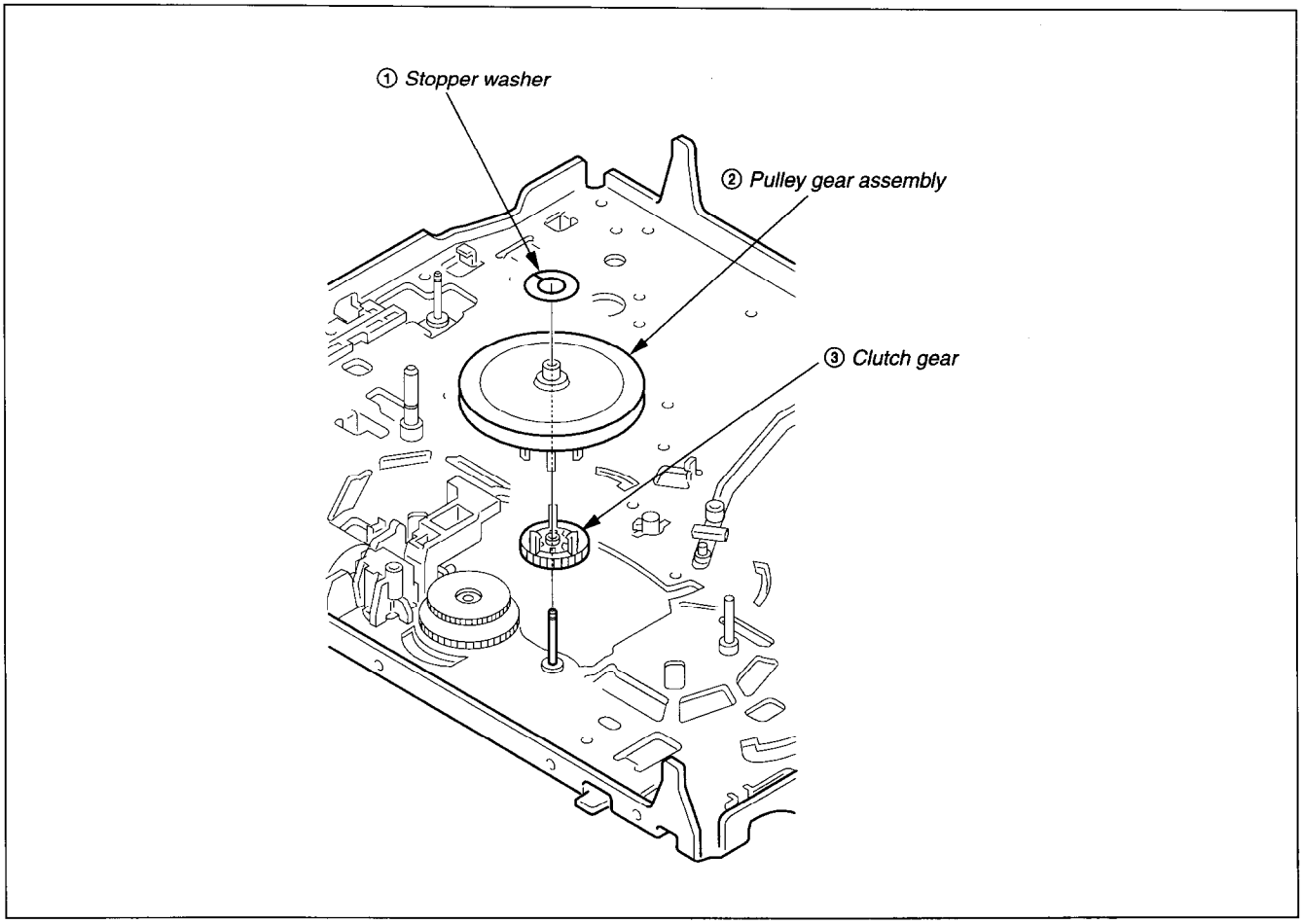


Fig. 3-24

3-20. REEL DIRECT ASSEMBLY

1) Remove rubber belt. (Refer to 3-5.)
2) Remove pulley gear assembly with clutch gear. (Refer to 3-19.)
3) Remove stopper washer ① and reel direct assembly ②.

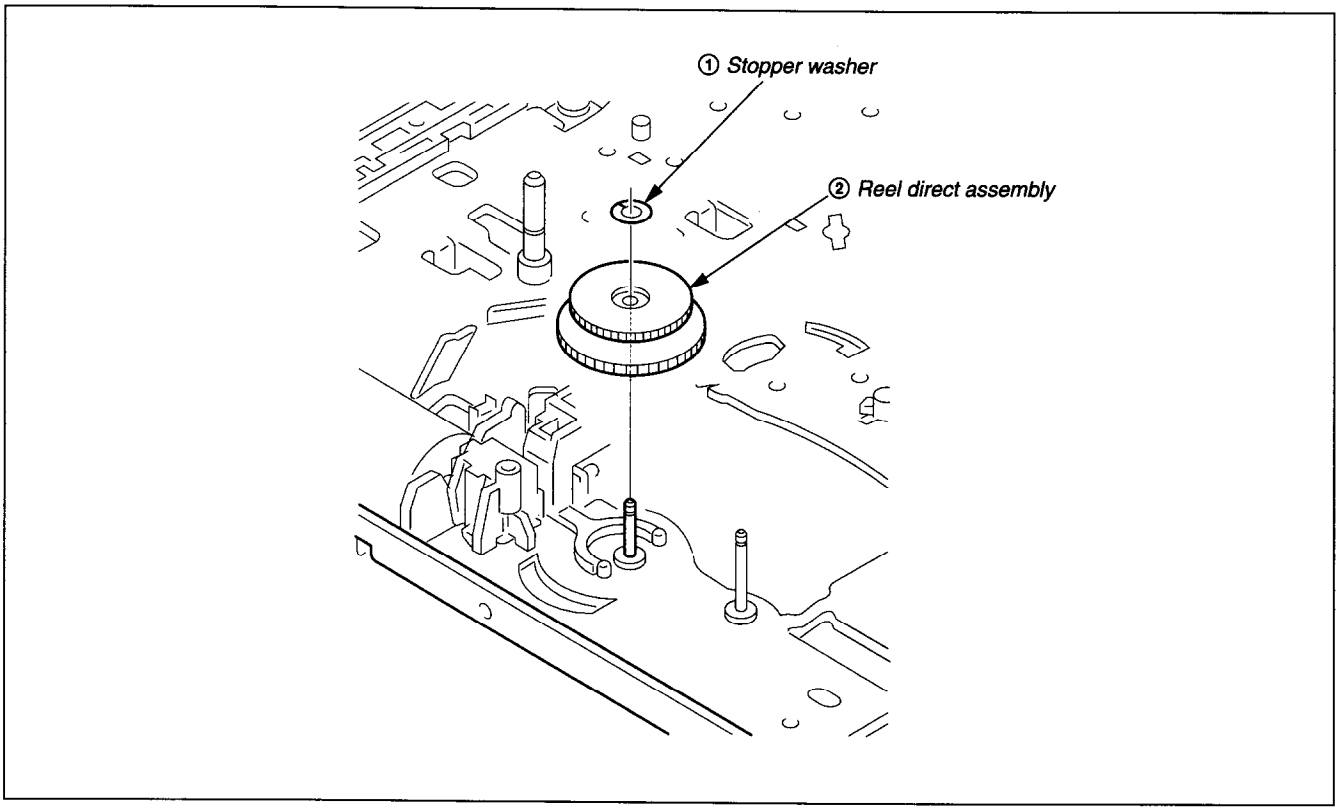


Fig. 3-25

3-21. CASSETTE GUIDE PLATE

1) Remove a screw (P 3 × 8) ① and remove cassette guide plate ②.

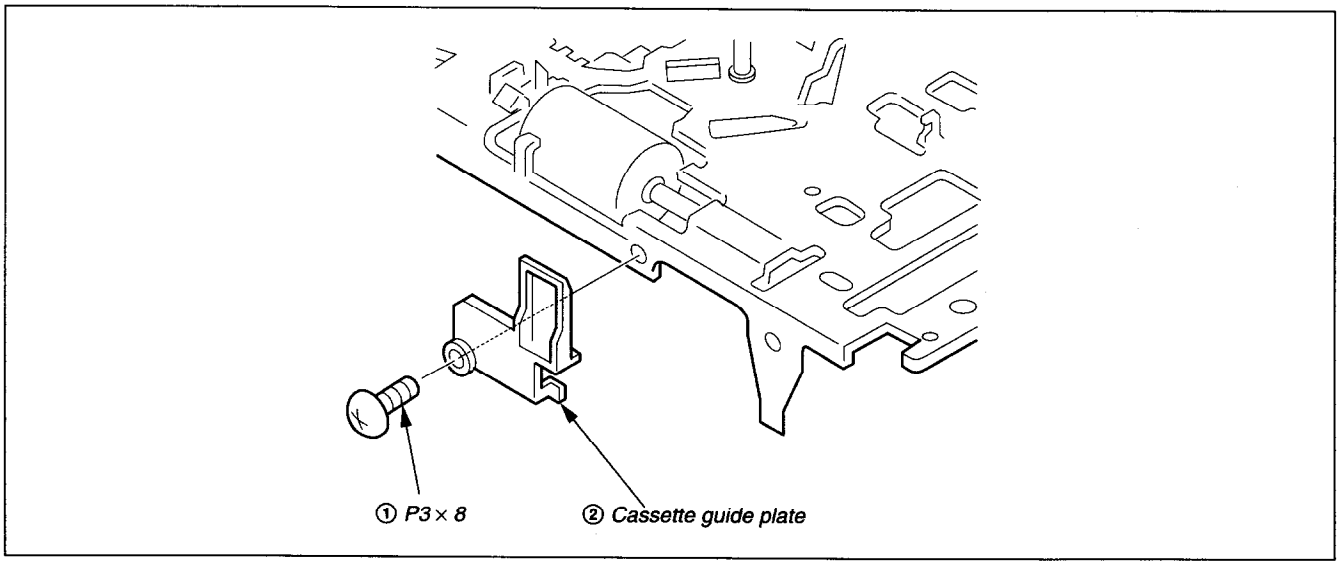


Fig. 3-26

3-23. DRUM BASE, HC ROLLER BLOCK ASSEMBLY

1) Remove the drum assembly. (Refer to 3-2.)
2) Remove screws BVTP 3 × 8 ①.
3) Remove drum base ②.
4) Pull out HC roller assembly ③ straight in the arrow Ⓐ direction.

[Note on Mounting]
- Before attaching drum base ②, confirm the specified locations are coated with grease SG-646 (Ref. No. J-6).
- Tightening screws ① in the order ⓐ to ⓑ to ⓒ.

[Adjustment after Mounting]
- 4-1. Tape path adjustment

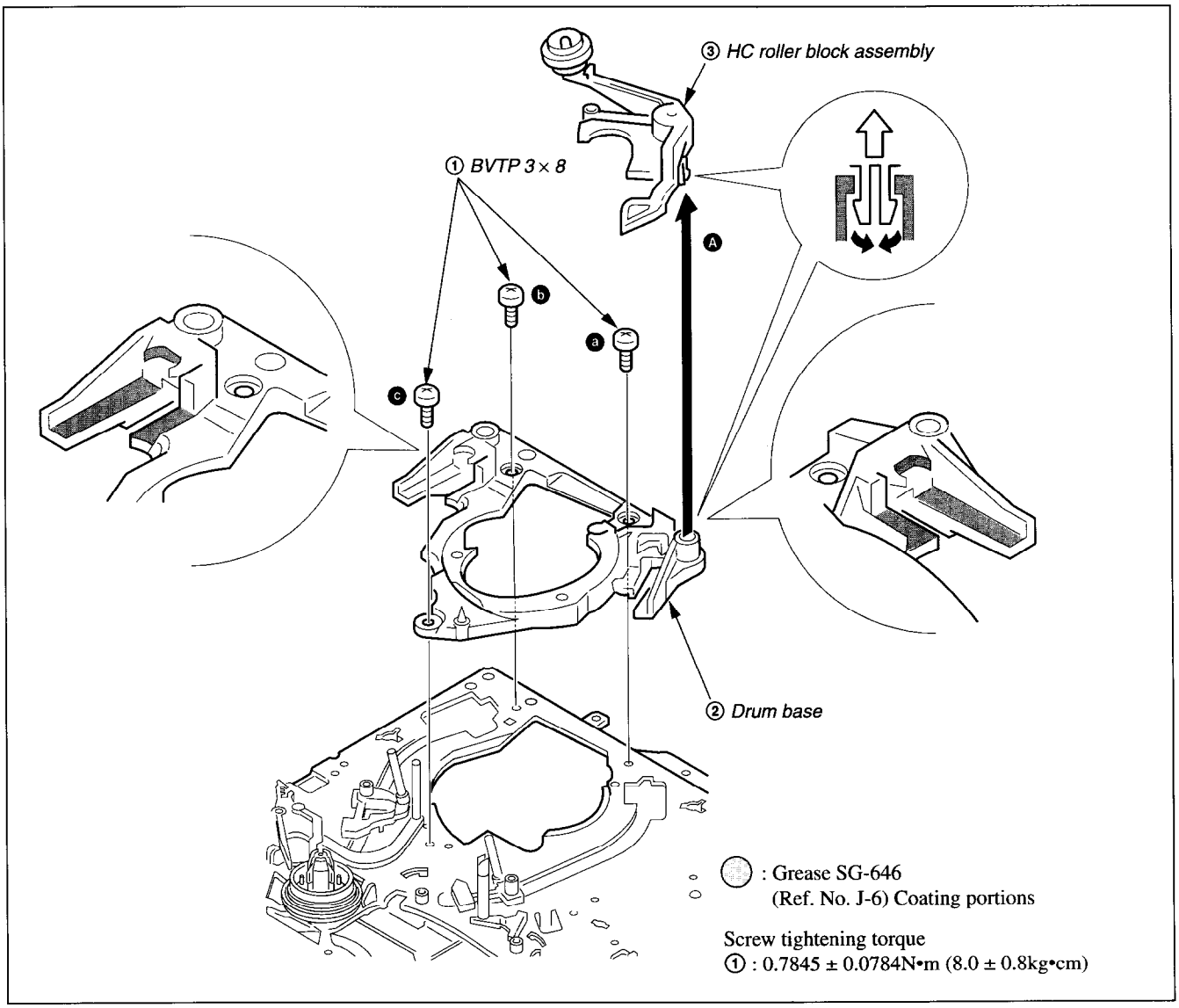


Fig. 3-28

3-24. SHUTTLE (S) AND SHUTTLE (T) BLOCK ASSEMBLIES

1. Guide Roller Assemblies

1) Turn them counterclockwise, then they are out of place, also springs.

[Note on Mounting]

Don't touch the surface that contacts tape with bare hand.

[Adjustment after Mounting]

• 4-1. Tape path adjustment

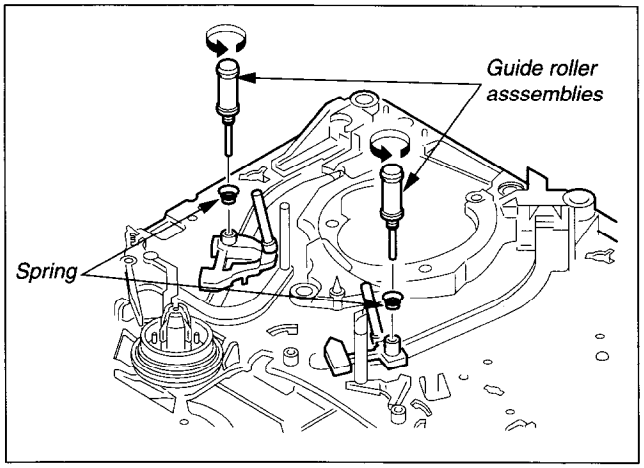


Fig. 3-29

2. Shuttle (S) and Shuttle (T) Assemblies

1) Remove FL complete assembly. (Refer to 3-1.)
2) Remove the drum assembly. (Refer to 3-2.)
3) Remove rubber belt. (Refer to 3-4.)
4) Remove FL slider block assembly. (Refer to 3-12.)
5) Remove cam gear. (Refer to 3-13.)
6) Remove slider. (Refer to 3-16.)
7) Remove loading (T) gear assembly and loading (S) gear assembly. (Refer to 3-18.)
8) Remove drum base. (Refer to 3-23.)
9) Remove shuttle (S) or shuttle (T) assembly by slide them backward.

[Note on Mounting]

Don't touch the surface that contacts tape with bare hand.

[Adjustment after Mounting]

• 4-1. Tape path adjustment

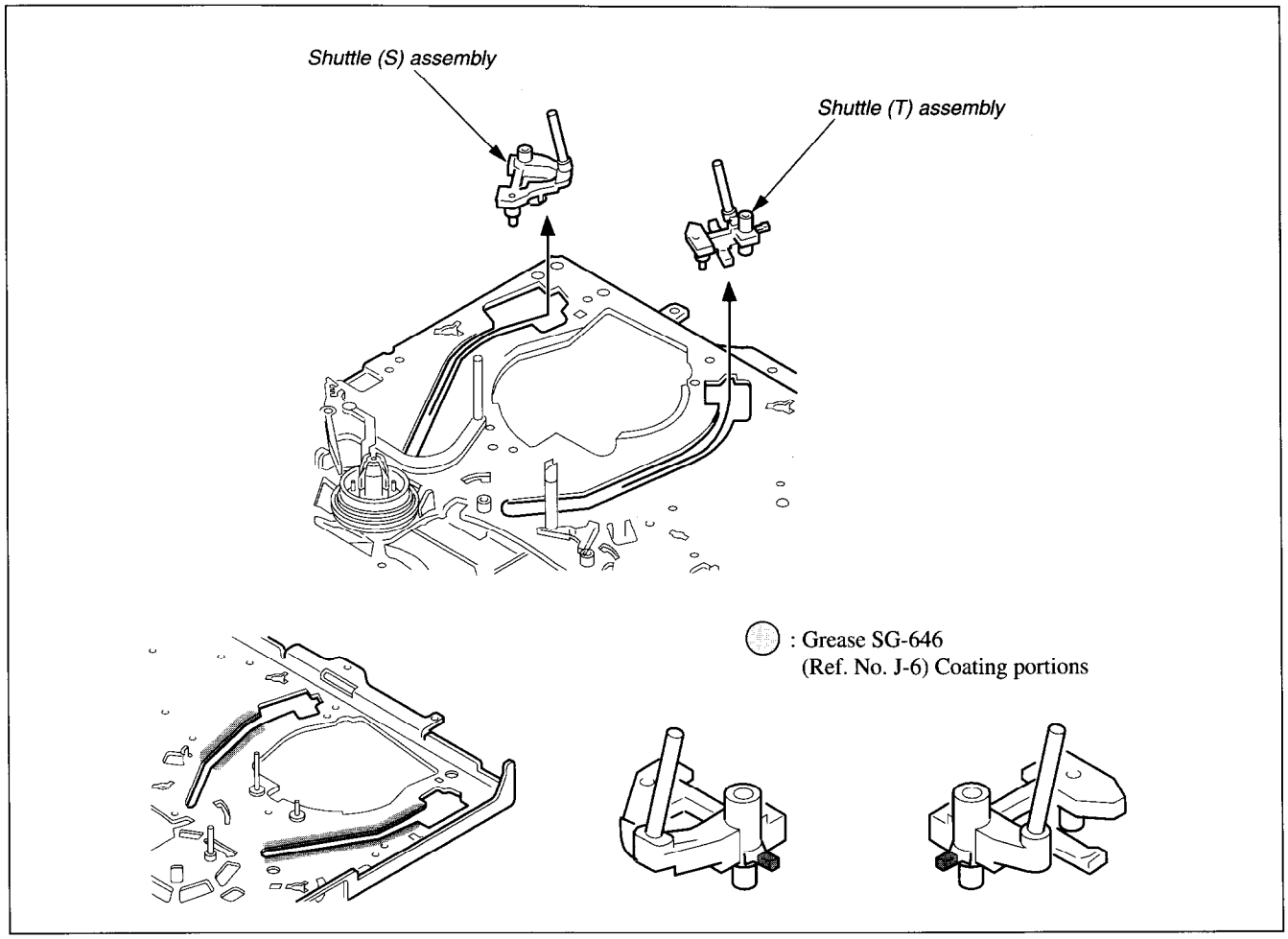


Fig. 3-30

3-25. TG1 ASSEMBLY, REEL (S) TABLE

1) Remove FL complete assembly. (Refer to 3-1.)
2) Remove spring (power tension) ① from TG1 driving arm.
3) While spreading claws on the bottom in the arrows Ⓐ direction, pull TG1 assembly ② out.
4) While spreading claws on the top in the arrows Ⓑ direction, pull reel (S) table ③ out.
5) Remove thrust washer ④.

[Note on Mounting]

Don't touch the surface that contacts tape and the braking surface of TG1 assembly with bare hand.

[Adjustment after Mounting]

• 4-1. Tape path adjustment

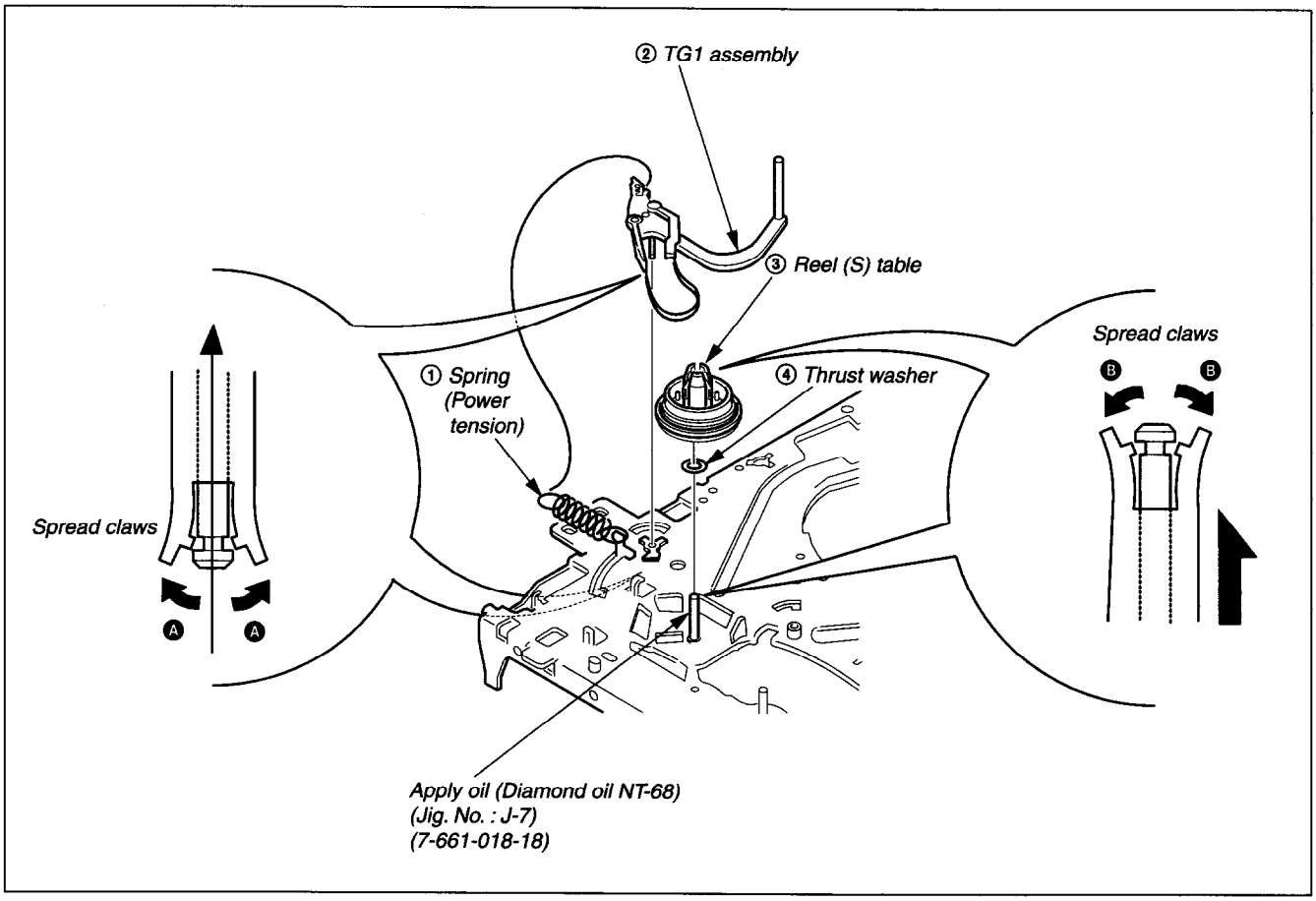


Fig. 3-31

3-26. TG1 FULCRUM BOSS

1) Remove FL complete assembly. (Refer to 3-1.)
2) Remove TG1 assembly. (Refer to 3-25.)
3) Turn TG1 fulcrum boss counterclockwise and pull it out.

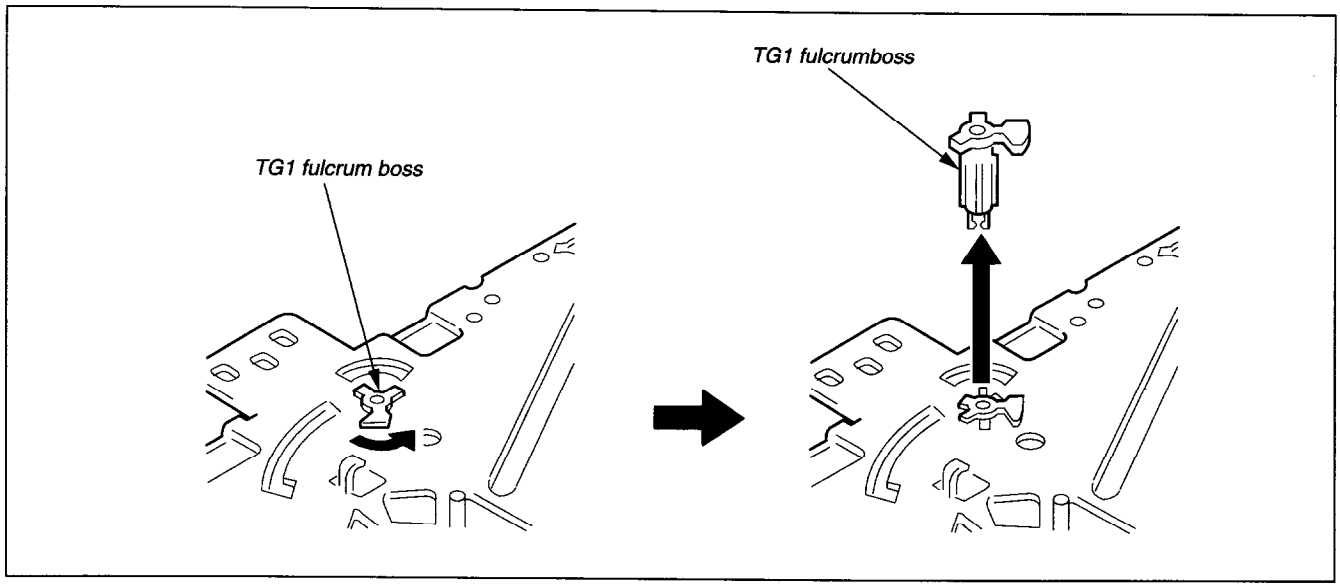


Fig. 3-32

3-27. LUMINOUS PLATE

1) Remove main (T) brake assembly. (Refer to 3-9.)
2) Turn luminous plate clockwise while raising a portion Ⓐ slightly and pull out it.

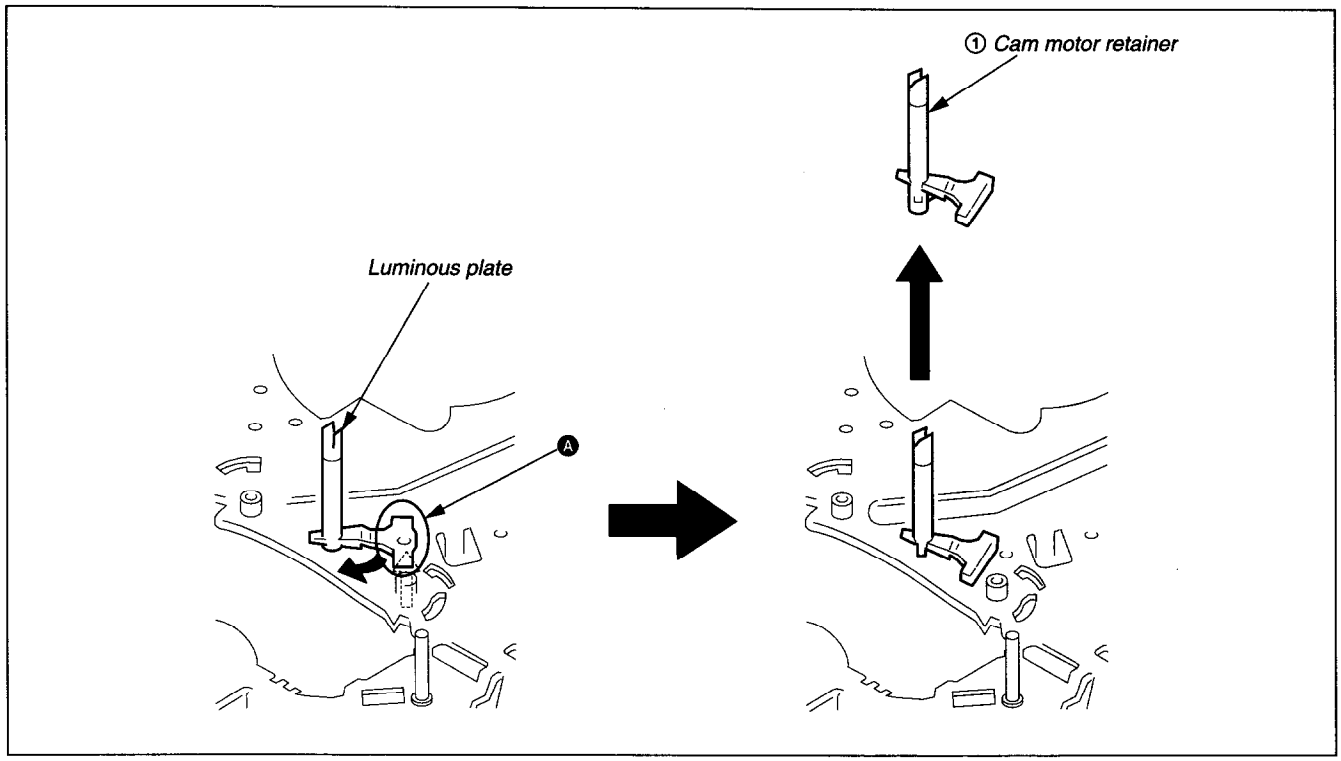


Fig. 3-33

4. ADJUSTMENT

4-1. TAPE PATH ADJUSTMENT

The "Tape path" refers to the route of the tape from the supply reel disk to the take-up reel disc via the video heads.
Each component part of the tape transport system particularly the surface of parts which make direct contact with the tape must always be kept clean, free of dust, oil, scratches and so forth.
The tape path system is factory pre-adjusted, when parts of the tape transport system are replaced, be sure to make the required adjustments as precisely as possible in order to ensure stable tape transport.

4-1-1. TENSION REGULATOR (TG1) POSITION/ TENSION ADJUSTMENT (Fig. 4-1)

Purpose: stabilizes contact of the video head and the tape to maintain the tension of the tape so that it feeds at a constant level.

• Position adjustment

Mode	Threading is completed without a cassette loaded (Playback)
Adjustment locations	Eccentric pin of TG1 band assembly

[Adjustment Method]

1) Allow the unit to go through the threading procedure without a cassette loaded.
2) Set the unit to play back, then turn the eccentric pin so that the tip of tension arm goes to the left side line carved on the mechanical chassis. (Fig. A)
3) After adjustment, go through the loading procedure once more without a cassette loaded, then check the position of the tension arm.

• Tension adjustment

Mode	Playback (SP)
Measuring instrument/tool	Torque cassette VHT-103S (Ref. No. J-1)
Adjustment locations	Position for hooking the tension spring
Specified value	5.05 to 6.52 mN•m (51.5 to 66.5g•cm) (without TC assembly) 3.78 to 5.10 mN•m (38.5 to 52.0g•cm) (with TC assembly)

[Adjustment Method]

1) Playback the torque cassette.
2) Check that the center value deviation reading on the torque cassette meets with the standards.
3) When the reading is higher than the standards : Move the spring toward direction Ⓐ.
   When the reading is less than the standards : Move the spring toward direction Ⓑ.

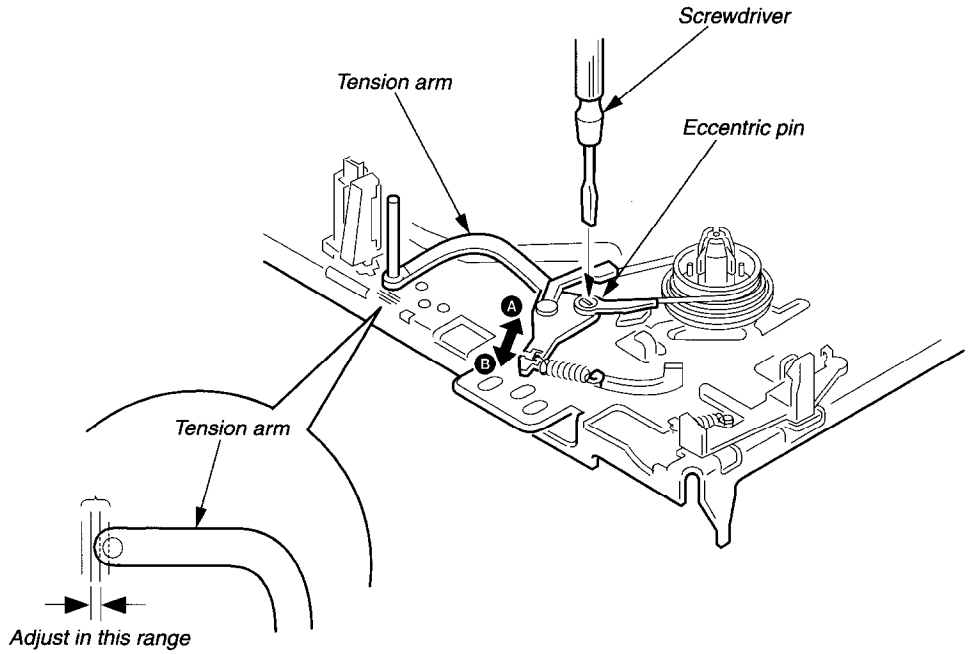


Fig. A

Fig. 4-1

4-1-2. CHECKING THE TENSION AND TORQUE

Purpose : To check that the tension, torque and compression force of the tape take-up section and mobile sections to ensure smooth tape run and achieve standard VTR performance.
If the tape transport is not smooth or problems occur in relation to the tape transport speed, perform the following check.

Mode	Each operation mode
Measuring instrument	Torque cassette VHT-103S, VHT-404S

Item	VTR operation mode	Reel to be measured	Measurement value
Review torque	Review	S reel	12.7 to 19.6 mN•m (130 to 200 g•cm)
Take-up torque	Playback	T reel	4.41 to 10.8 mN•m (45 to 110g•cm)
Back tension torque	Playback	S reel	See section 4-1-1.

4-1-3. X-VALUE ADJUSTMENT (Using the tape having the version No.)

Purpose: To obtain compatibility with other VCRs.

Precaution: Before starting to adjust X-value, set the tracking control at the center position. To set the tracking control at the center position for the VCRs equipped with the [▲] and [▼] tracking control keys, press both the [▲] and [▼] tracking control keys at the same time. For the VCRs not equipped with the tracking control keys, deactivate the automatic tracking control by pressing the tracking [AUTO/MANUAL] key on the remote control unit during threading operation (after a tape is inserted but before the VCR starts playing back the tape).

Mode	Playback
Signal	Alignment tape: KRV-52NE (NTSC)/ 52PL(PAL)
Measuring instrument	Oscilloscope TIME/DIV: 2ms Trigger source: CH2 Trigger slope: +
Measuring point	CH1: Connector PB RF pin for RF PC board check CH2: Connector RF SWP pin for RF PC board check
Adjustment locations	ACE base assembly

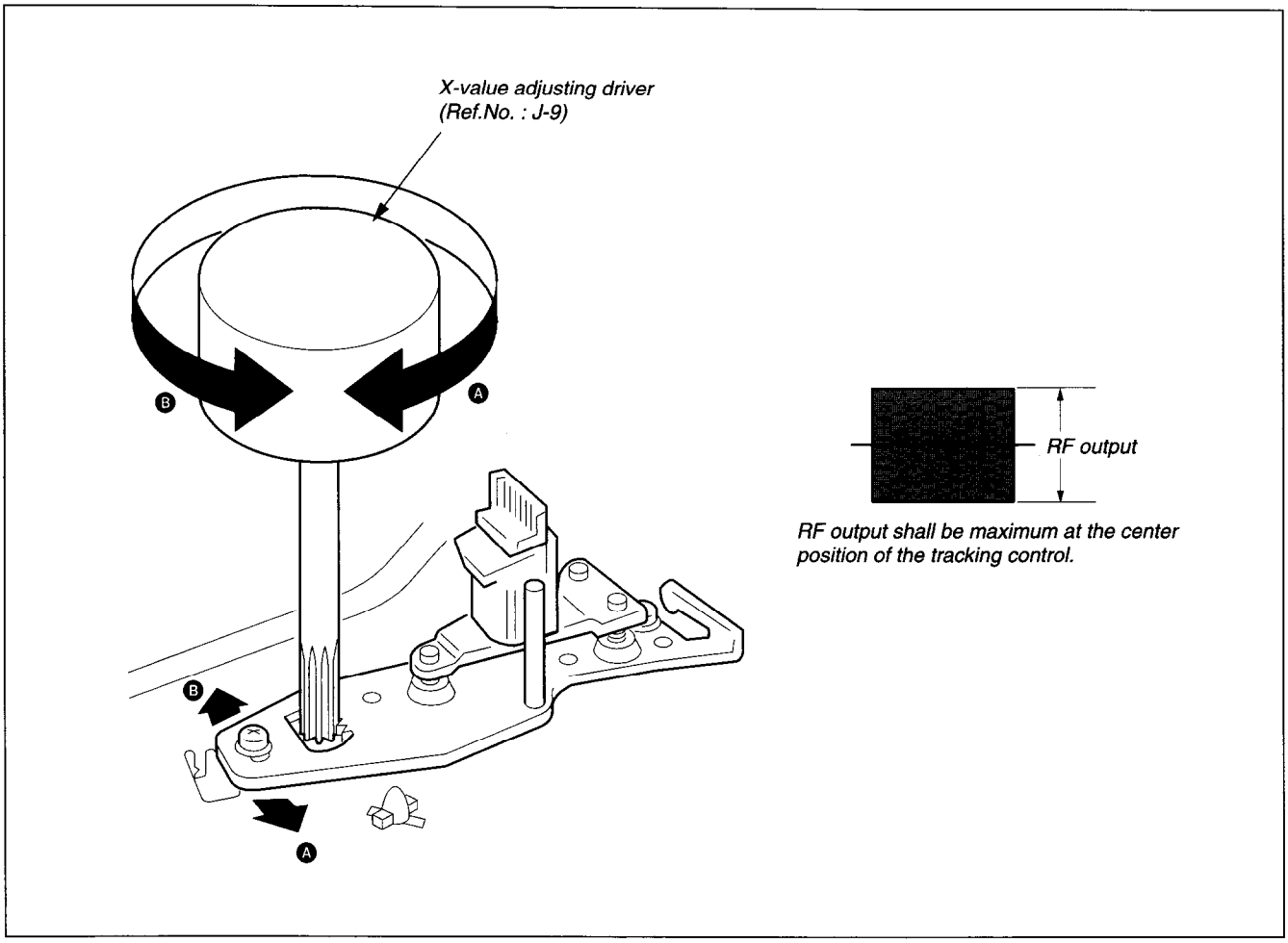


Fig. 4-2

[Adjustment Method]

Set the tracking control at the center position. For the VCRs equipped with standard gap video heads, set the ACE head position with X-value adjusting driver where a maximum RF output is obtained. For the VCRs equipped with wide gap video heads, set the ACE head position with X-value adjusting driver both where a maximum RF output is obtained and where the RF output decreases immediately when the ▼ tracking control key is pressed.

* TYPE OF DRUM

DZH-68D	DZH-89A
DZH-71D	DZH-90A
DZH-77A	DZH-91A
DZH-78A	DZH-92A
DZH-78B	

1. Adjusting X-value (Using the tape having the version No.)

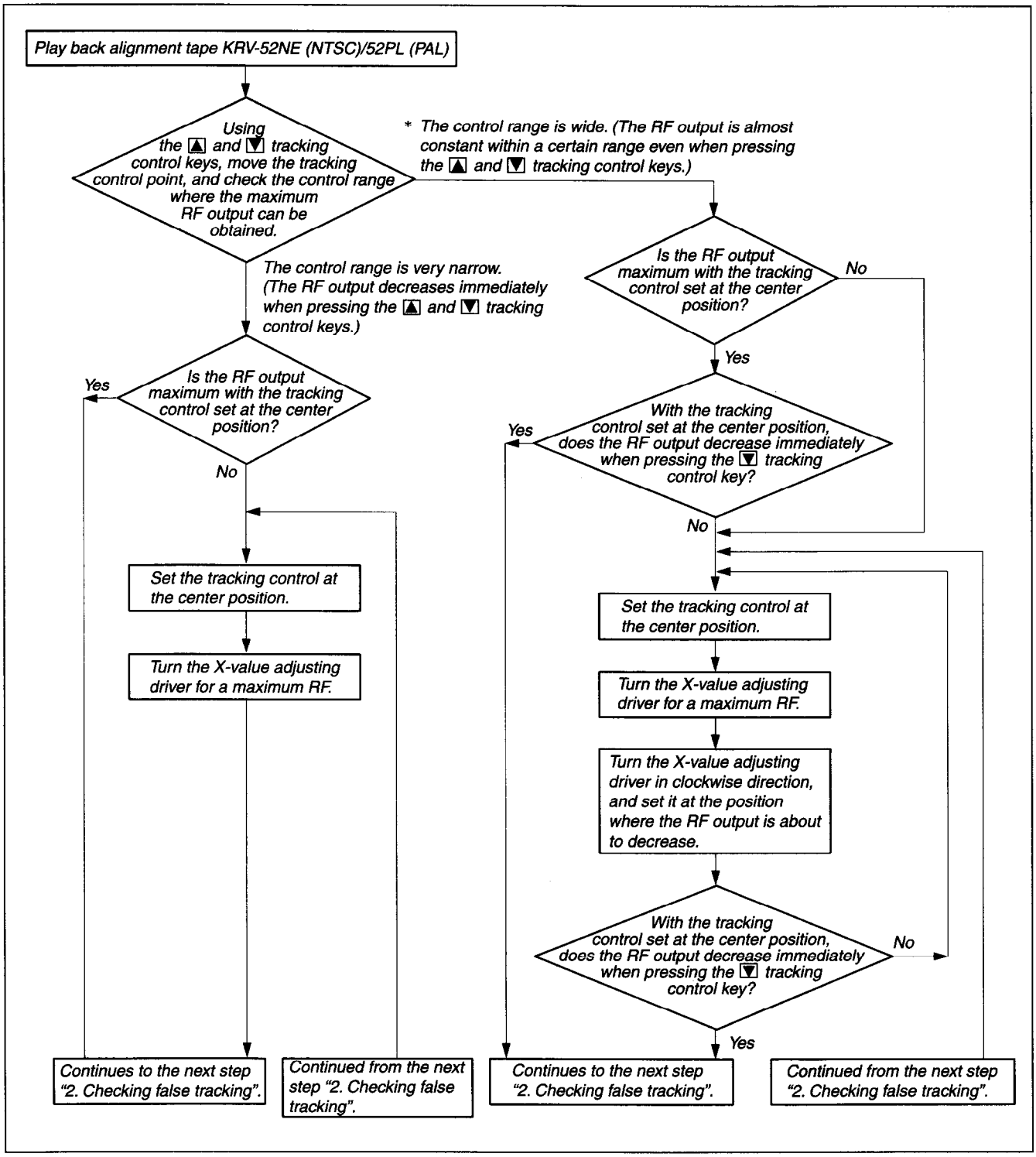

Play back alignment tape KRV-52NE (NTSC)/52PL (PAL)
Using the ▲ and ▼ tracking control keys, move the tracking control point, and check the control range where the maximum RF output can be obtained.
* The control range is wide. (The RF output is almost constant within a certain range even when pressing the ▲ and ▼ tracking control keys.)
The control range is very narrow. (The RF output decreases immediately when pressing the ▲ and ▼ tracking control keys.)
Is the RF output maximum with the tracking control set at the center position?
Yes
No
Is the RF output maximum with the tracking control set at the center position?
Yes
No
With the tracking control set at the center position, does the RF output decrease immediately when pressing the ▼ tracking control key?
Yes
No
Set the tracking control at the center position.
Turn the X-value adjusting driver for a maximum RF.
Set the tracking control at the center position.
Turn the X-value adjusting driver for a maximum RF.
Turn the X-value adjusting driver in clockwise direction, and set it at the position where the RF output is about to decrease.
With the tracking control set at the center position, does the RF output decrease immediately when pressing the ▼ tracking control key?
No
Yes
Continues to the next step "2. Checking false tracking".
Continued from the next step "2. Checking false tracking".
Continues to the next step "2. Checking false tracking".
Continued from the next step "2. Checking false tracking".

Table. 4-1

2. Checking false tracking
(Using the tape having the version No.)

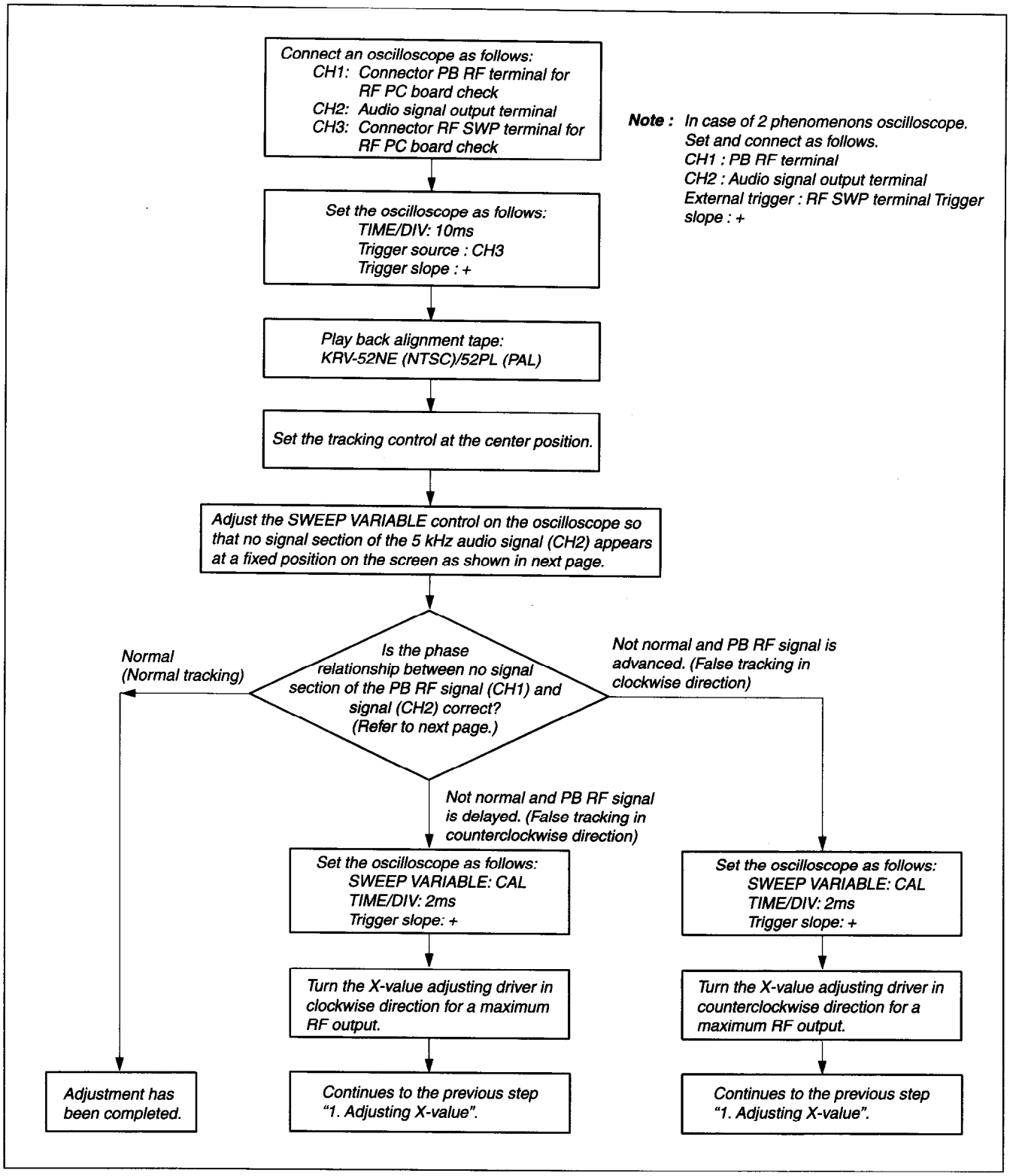

Connect an oscilloscope as follows:
CH1: Connector PB RF terminal for RF PC board check
CH2: Audio signal output terminal
CH3: Connector RF SWP terminal for RF PC board check
Note : In case of 2 phenomenons oscilloscope. Set and connect as follows.
CH1 : PB RF terminal
CH2 : Audio signal output terminal
External trigger : RF SWP terminal Trigger slope : +
Set the oscilloscope as follows:
TIME/DIV: 10ms
Trigger source : CH3
Trigger slope : +
Play back alignment tape:
KRV-52NE (NTSC)/52PL (PAL)
Set the tracking control at the center position.
Adjust the SWEEP VARIABLE control on the oscilloscope so that no signal section of the 5 kHz audio signal (CH2) appears at a fixed position on the screen as shown in next page.
Is the phase relationship between no signal section of the PB RF signal (CH1) and signal (CH2) correct? (Refer to next page.)
Normal (Normal tracking)
Not normal and PB RF signal is advanced. (False tracking in clockwise direction)
Not normal and PB RF signal is delayed. (False tracking in counterclockwise direction)
Set the oscilloscope as follows:
SWEEP VARIABLE: CAL
TIME/DIV: 2ms
Trigger slope: +
Set the oscilloscope as follows:
SWEEP VARIABLE: CAL
TIME/DIV: 2ms
Trigger slope: +
Turn the X-value adjusting driver in clockwise direction for a maximum RF output.
Turn the X-value adjusting driver in counterclockwise direction for a maximum RF output.
Adjustment has been completed.
Continues to the previous step "1. Adjusting X-value".
Continues to the previous step "1. Adjusting X-value".

Table. 4-2

Using the tape having the version No.

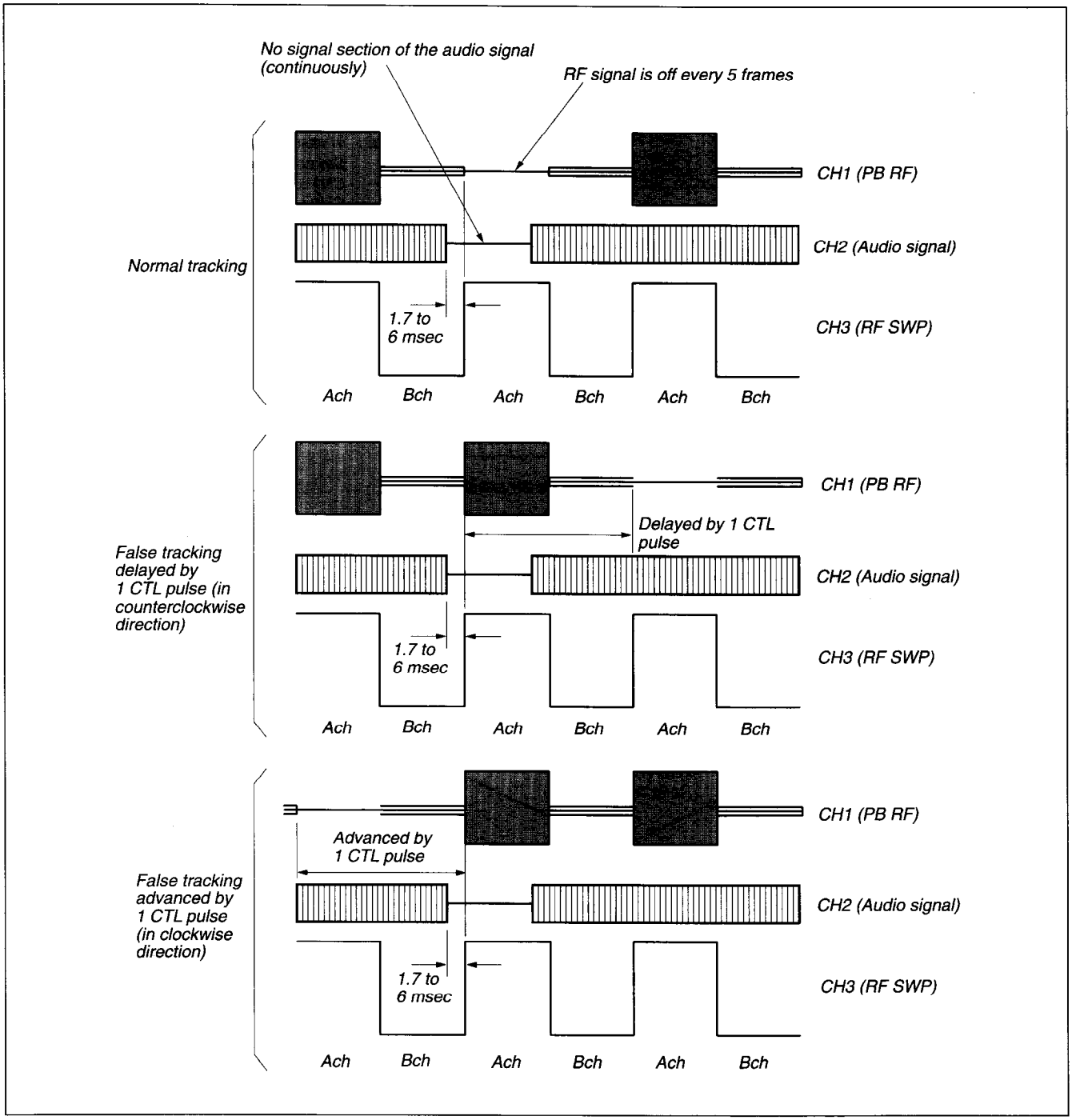


Table. 4-3

[Adjustment Method (*For the VCRs Equipped with Narrow Gap Video Heads)]

Set the tracking control at the center position. Set the ACE head position with X-value adjusting driver both where a maximum RF output is obtained and where the RF output decreases immediately when the ▲ tracking control key is pressed.

* TYPE OF DRUM
DZH-98A

1. Adjusting X-value
(Using the tape having the version No.)

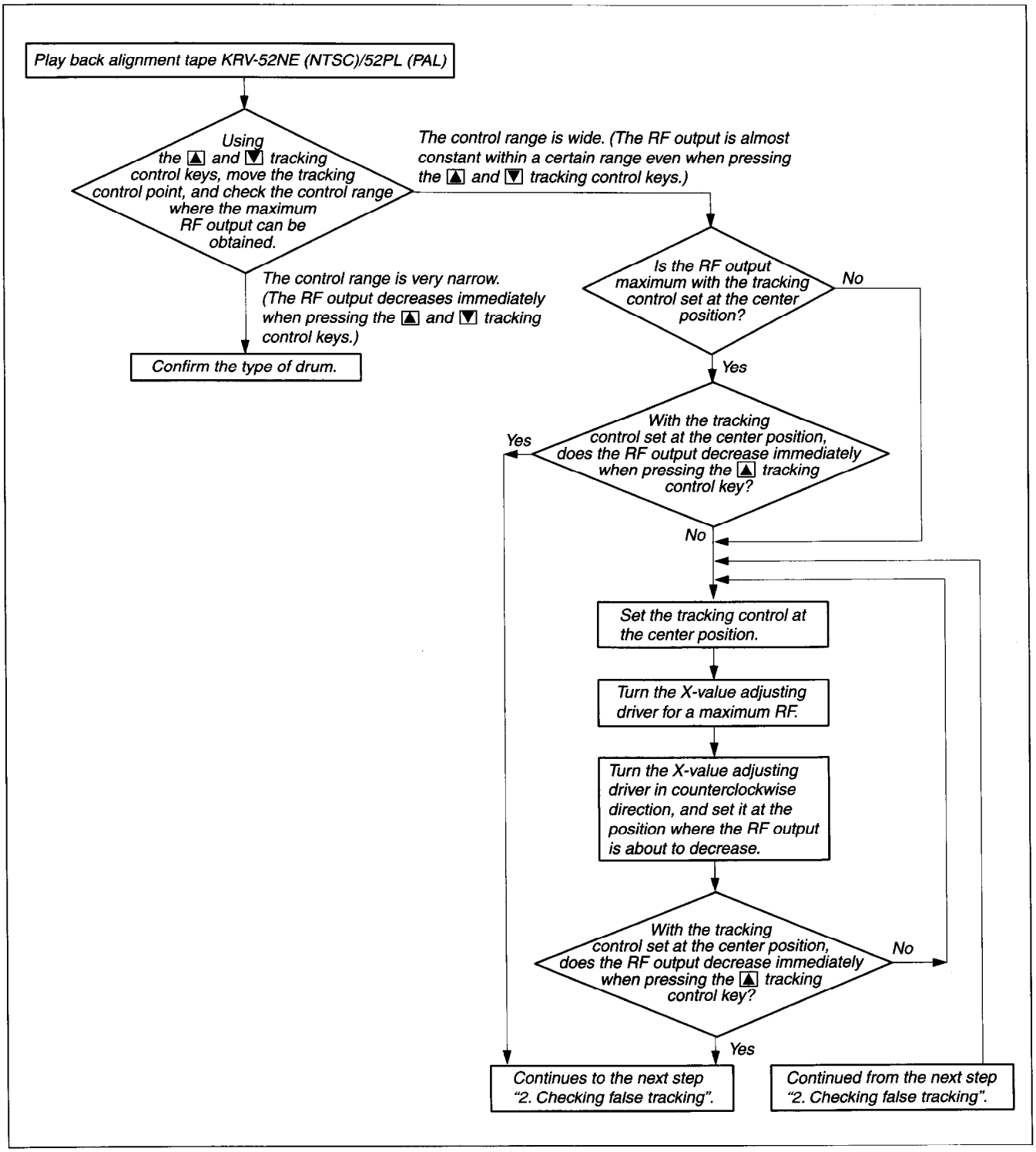

Play back alignment tape KRV-52NE (NTSC)/52PL (PAL)
Using the ▲ and ▼ tracking control keys, move the tracking control point, and check the control range where the maximum RF output can be obtained.
The control range is wide. (The RF output is almost constant within a certain range even when pressing the ▲ and ▼ tracking control keys.)
The control range is very narrow. (The RF output decreases immediately when pressing the ▲ and ▼ tracking control keys.)
Confirm the type of drum.
Is the RF output maximum with the tracking control set at the center position?
No
Yes
With the tracking control set at the center position, does the RF output decrease immediately when pressing the ▲ tracking control key?
Yes
No
Set the tracking control at the center position.
Turn the X-value adjusting driver for a maximum RF.
Turn the X-value adjusting driver in counterclockwise direction, and set it at the position where the RF output is about to decrease.
With the tracking control set at the center position, does the RF output decrease immediately when pressing the ▲ tracking control key?
No
Yes
Continues to the next step "2. Checking false tracking".
Continued from the next step "2. Checking false tracking".

Table. 4-4

2. Checking false tracking (Using the tape having the version No.)

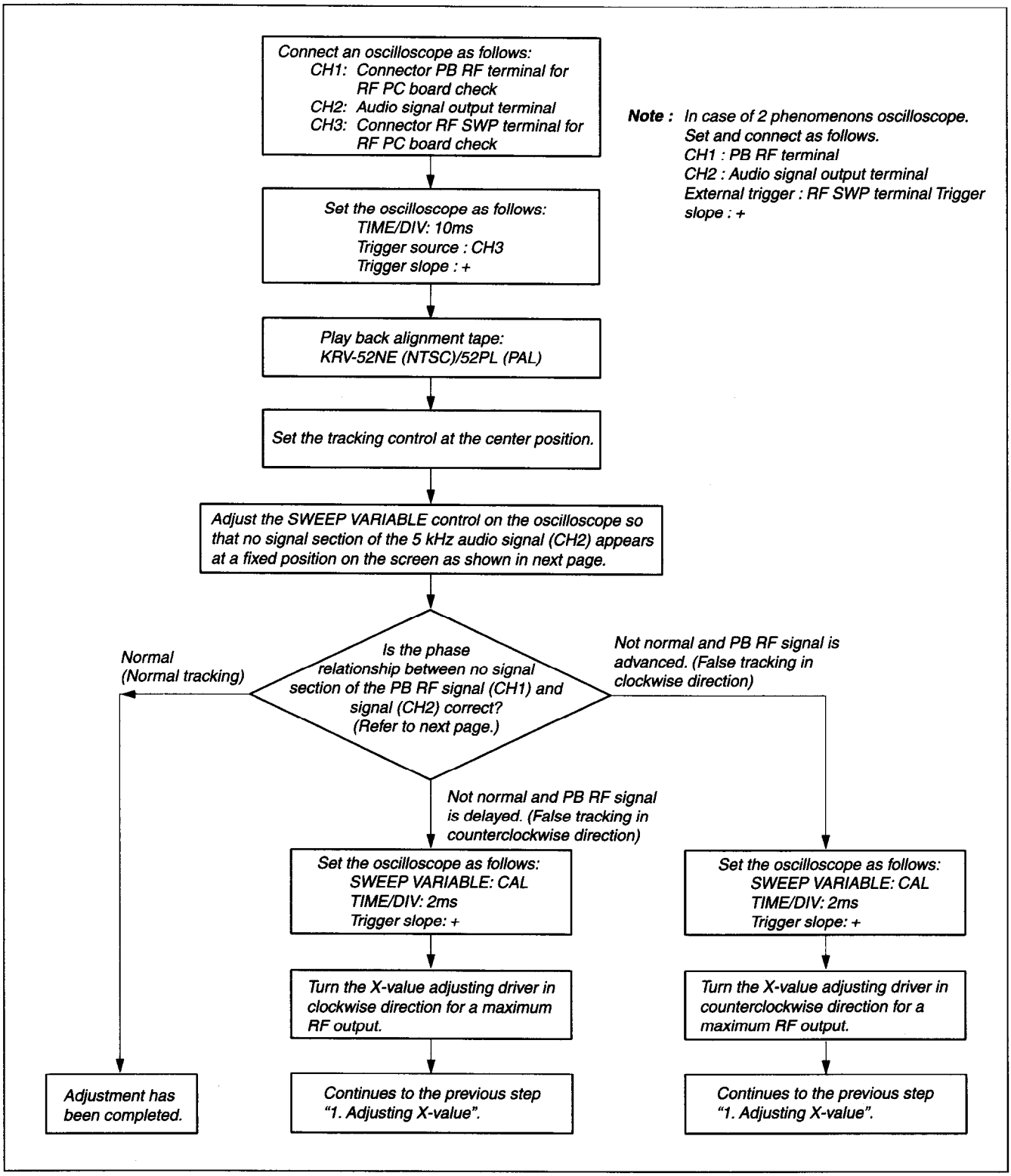

Connect an oscilloscope as follows:
CH1: Connector PB RF terminal for RF PC board check
CH2: Audio signal output terminal
CH3: Connector RF SWP terminal for RF PC board check
Note : In case of 2 phenomenons oscilloscope. Set and connect as follows.
CH1 : PB RF terminal
CH2 : Audio signal output terminal
External trigger : RF SWP terminal Trigger slope : +
Set the oscilloscope as follows:
TIME/DIV: 10ms
Trigger source : CH3
Trigger slope : +
Play back alignment tape:
KRV-52NE (NTSC)/52PL (PAL)
Set the tracking control at the center position.
Adjust the SWEEP VARIABLE control on the oscilloscope so that no signal section of the 5 kHz audio signal (CH2) appears at a fixed position on the screen as shown in next page.
Is the phase relationship between no signal section of the PB RF signal (CH1) and signal (CH2) correct? (Refer to next page.)
Normal (Normal tracking)
Not normal and PB RF signal is advanced. (False tracking in clockwise direction)
Not normal and PB RF signal is delayed. (False tracking in counterclockwise direction)
Set the oscilloscope as follows:
SWEEP VARIABLE: CAL
TIME/DIV: 2ms
Trigger slope: +
Set the oscilloscope as follows:
SWEEP VARIABLE: CAL
TIME/DIV: 2ms
Trigger slope: +
Turn the X-value adjusting driver in clockwise direction for a maximum RF output.
Turn the X-value adjusting driver in counterclockwise direction for a maximum RF output.
Adjustment has been completed.
Continues to the previous step "1. Adjusting X-value".
Continues to the previous step "1. Adjusting X-value".

Table. 4-5

Using the tape having the version No.

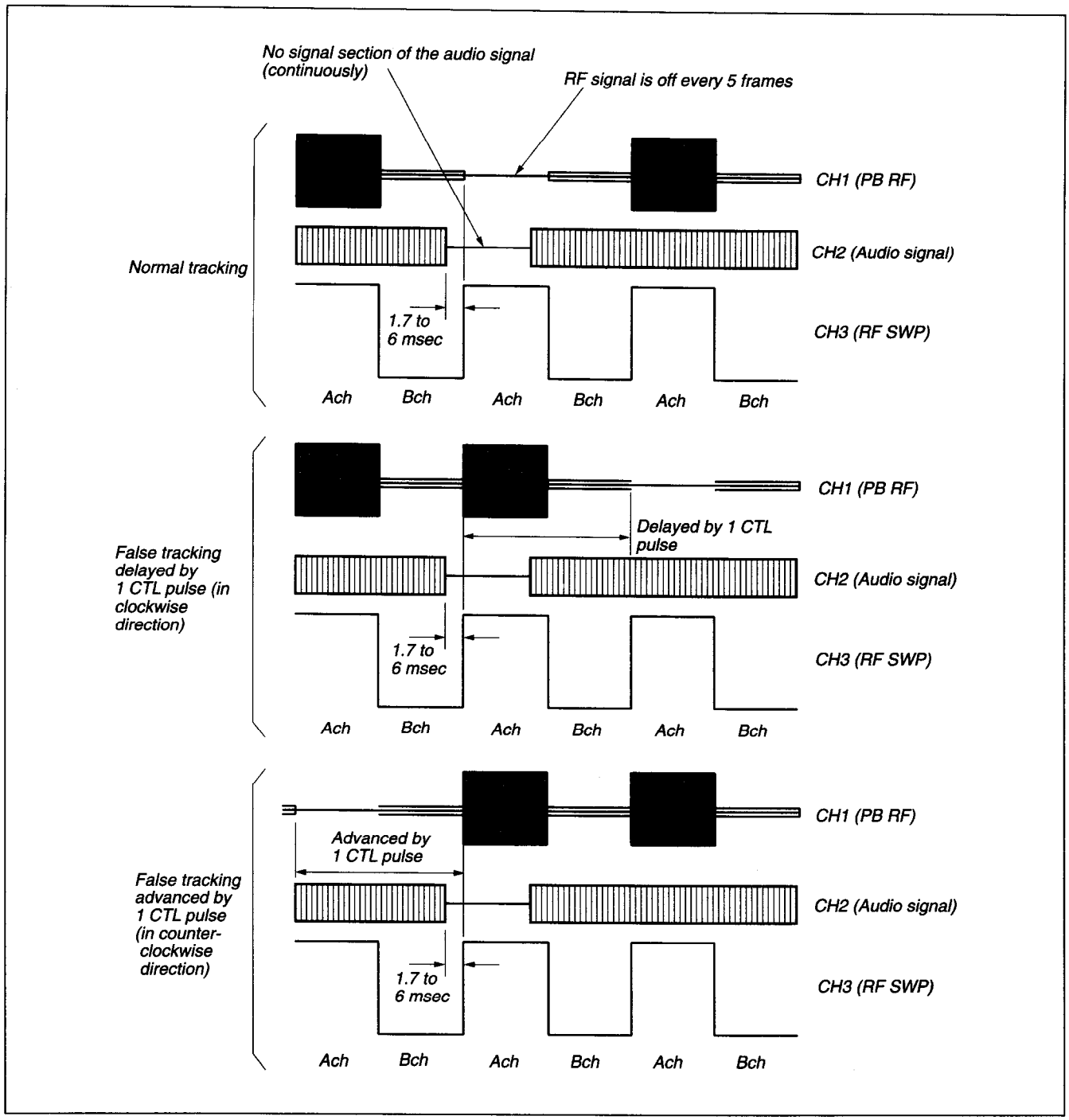


Table. 4-6

3-22. CAM MOTOR ASSEMBLY, LIMITER SELECTION ARM

1) Remove FL complete assembly. (Refer to 3-1.)
2) Remove rubber belt. (Refer to 3-4.)
3) Remove FL slider block assembly. (Refer to 3-12.)
4) Remove worm wheel. (Refer to 3-13.)
5) Remove pulley gear assembly with clutch gear. (Refer to 3-19.)
6) Remove and reel direct assembly. (Refer to 3-20.)
7) Remove cam motor retainer ① in the arrow Ⓑ while pushing its claw in the arrow Ⓐ direction.
8) Then cam motor assembly ② is out of place.
9) Remove the boss of limiter selection arm ③ from the hole on the mechanical chassis by pushing in the arrow Ⓒ direction and push it in the arrow Ⓓ direction and remove it in the arrow Ⓔ direction.

[Note on Mounting]

• Before attaching cam motor assembly ②, confirm the specified locations are coated with grease SG-646 (Ref. No. J-6).

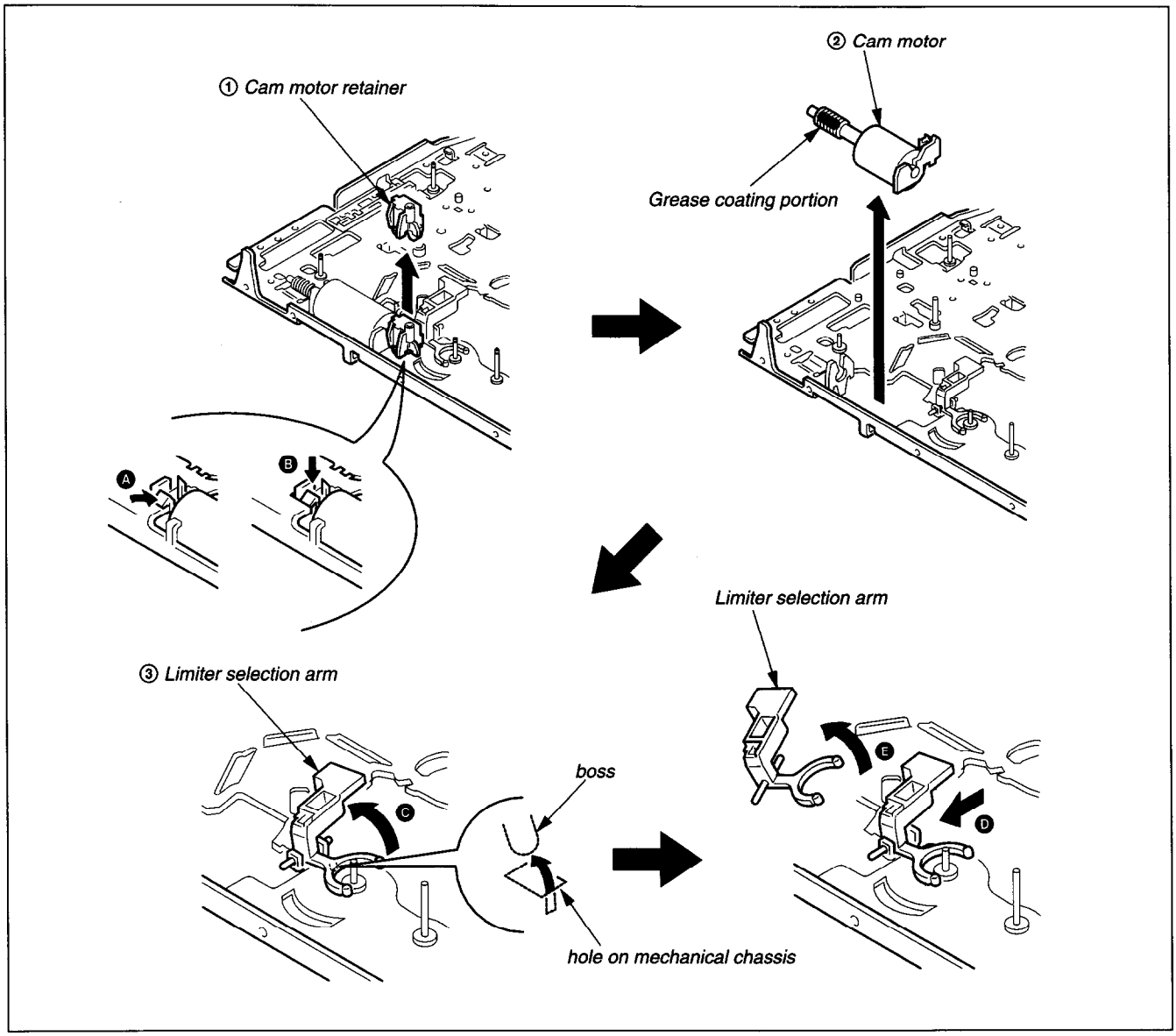


Fig. 3-27

Reference

• X-VALUE ADJUSTMENT
(Using KRV-52NE having no version No.)

Purpose : To obtain compatibility with other VCRs.

Precaution : Before starting to adjust X-value, set the tracking control at the center position. To set the tracking control at the center position for the VCRs equipped with the ▲ and ▼ tracking control keys. Press both the ▲ and ▼ tracking control keys at the same time. For the VCRs not equipped with the tracking control keys, deactivate the automatic tracking control by pressing the tracking AUTO/MANUAL key on the remote control unit during threading operation (after a tape is inserted but before the VCR starts playing back the tape).

Mode	Playback
Signal	Alignment tape: KRV-52NE (For NTSC having no version No.)
Measuring instrument	Oscilloscope TIME/DIV: 2ms Trigger source: CH2 Trigger slope: +
Measuring point	CH1: Connector PB RF pin for RF PC board check CH2 : Connector RF SWP pin for RF PC board check
Adjustment locations	ACE base assembly

[Adjustment Method]

Set the tracking control at the center position. For the VCRs equipped with standard gap video heads, set the X-value adjustment screw where a maximum RF output is obtained. For the VCRs equipped with wide gap video heads, set the X-value adjustment screw both where a maximum RF output is obtained and where the RF output decreases immediately when the ▼ tracking control key is pressed.

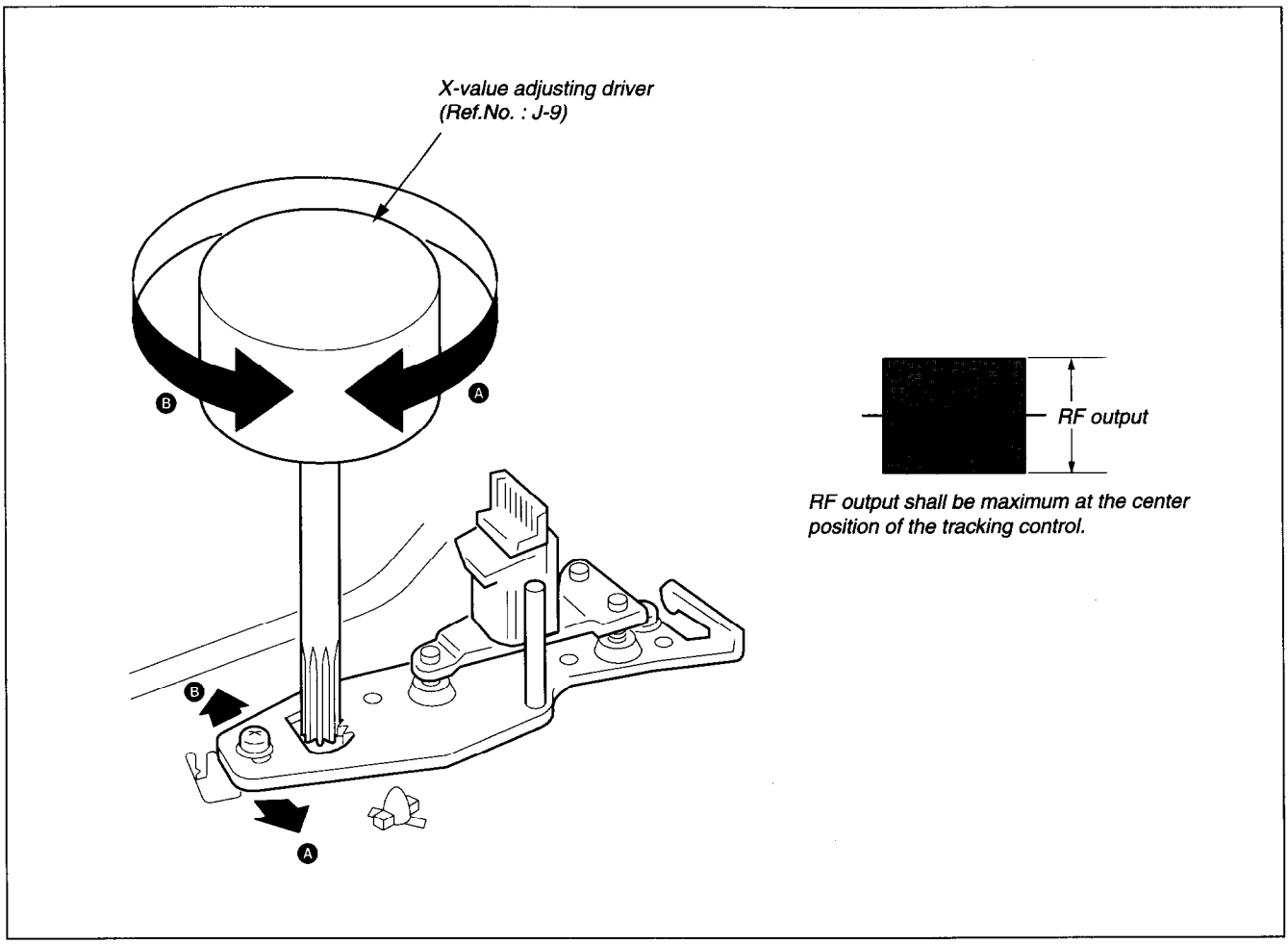


Fig. 4-3

X-VALUE ADJUSTMENT
(Using the tape having no version No.)

* TYPE OF DRUM

DZH-68D	DZH-89A
DZH-71D	DZH-90A
DZH-77A	DZH-91A
DZH-78A	DZH-92A
DZH-78B	

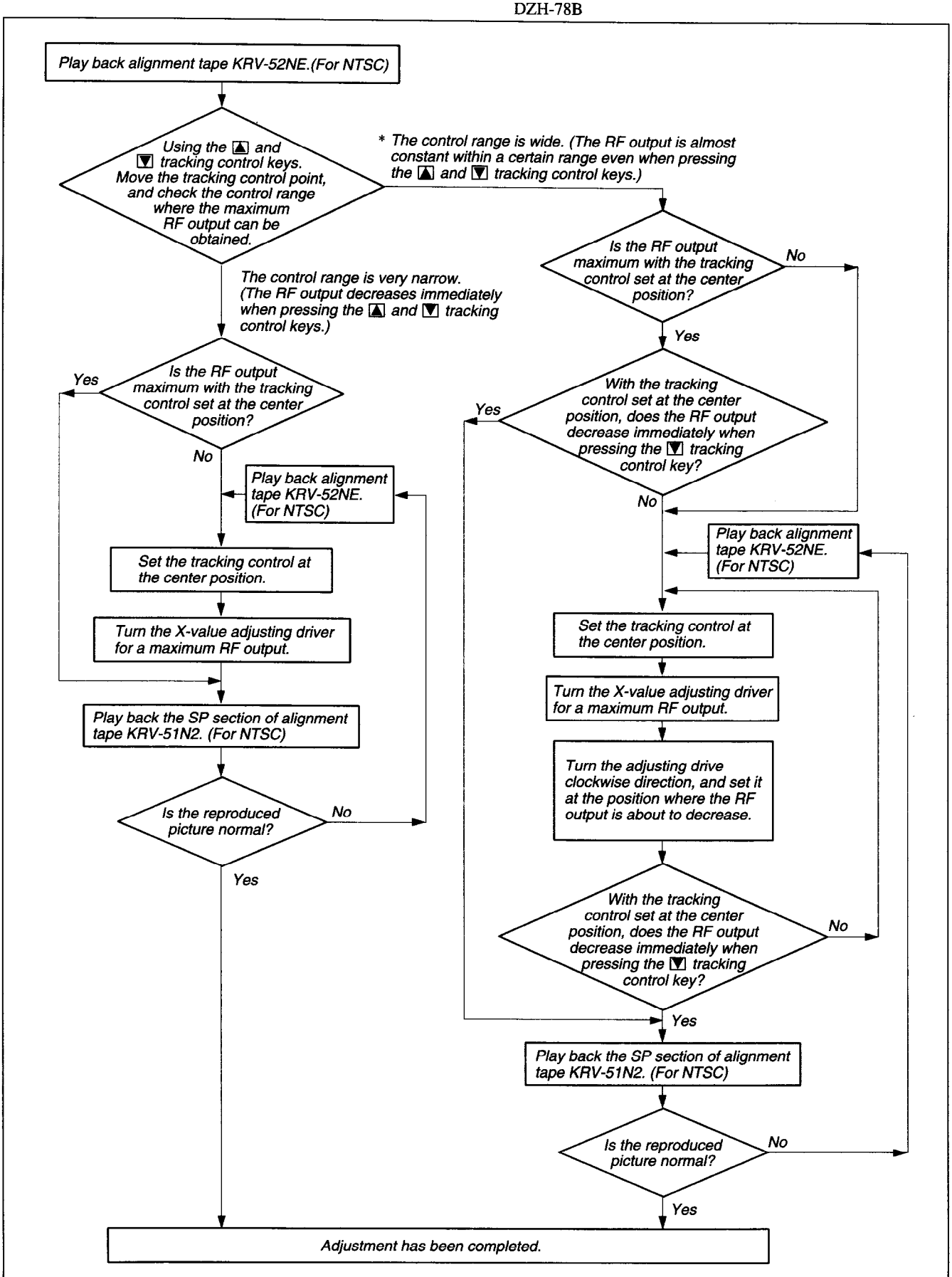

Play back alignment tape KRV-52NE.(For NTSC)
Using the ▲ and ▼ tracking control keys. Move the tracking control point, and check the control range where the maximum RF output can be obtained.
* The control range is wide. (The RF output is almost constant within a certain range even when pressing the ▲ and ▼ tracking control keys.)
The control range is very narrow. (The RF output decreases immediately when pressing the ▲ and ▼ tracking control keys.)
Is the RF output maximum with the tracking control set at the center position?
No
Yes
With the tracking control set at the center position, does the RF output decrease immediately when pressing the ▼ tracking control key?
Yes
No
Play back alignment tape KRV-52NE. (For NTSC)
Set the tracking control at the center position.
Turn the X-value adjusting driver for a maximum RF output.
Turn the adjusting drive clockwise direction, and set it at the position where the RF output is about to decrease.
Play back the SP section of alignment tape KRV-51N2. (For NTSC)
Is the reproduced picture normal?
Yes
No
Adjustment has been completed.

Table. 4-7

[Adjustment Method (*For the VCRs Equipped with Narrow Gap Video Heads)]

Set the tracking control at the center position. Set the ACE head position with X-value adjusting driver both where a maximum RF output is obtained and where the RF output decreases immediately when the ▲ tracking control key is pressed.

* TYPE OF DRUM
DZH-98A

Using the tape having the version No.

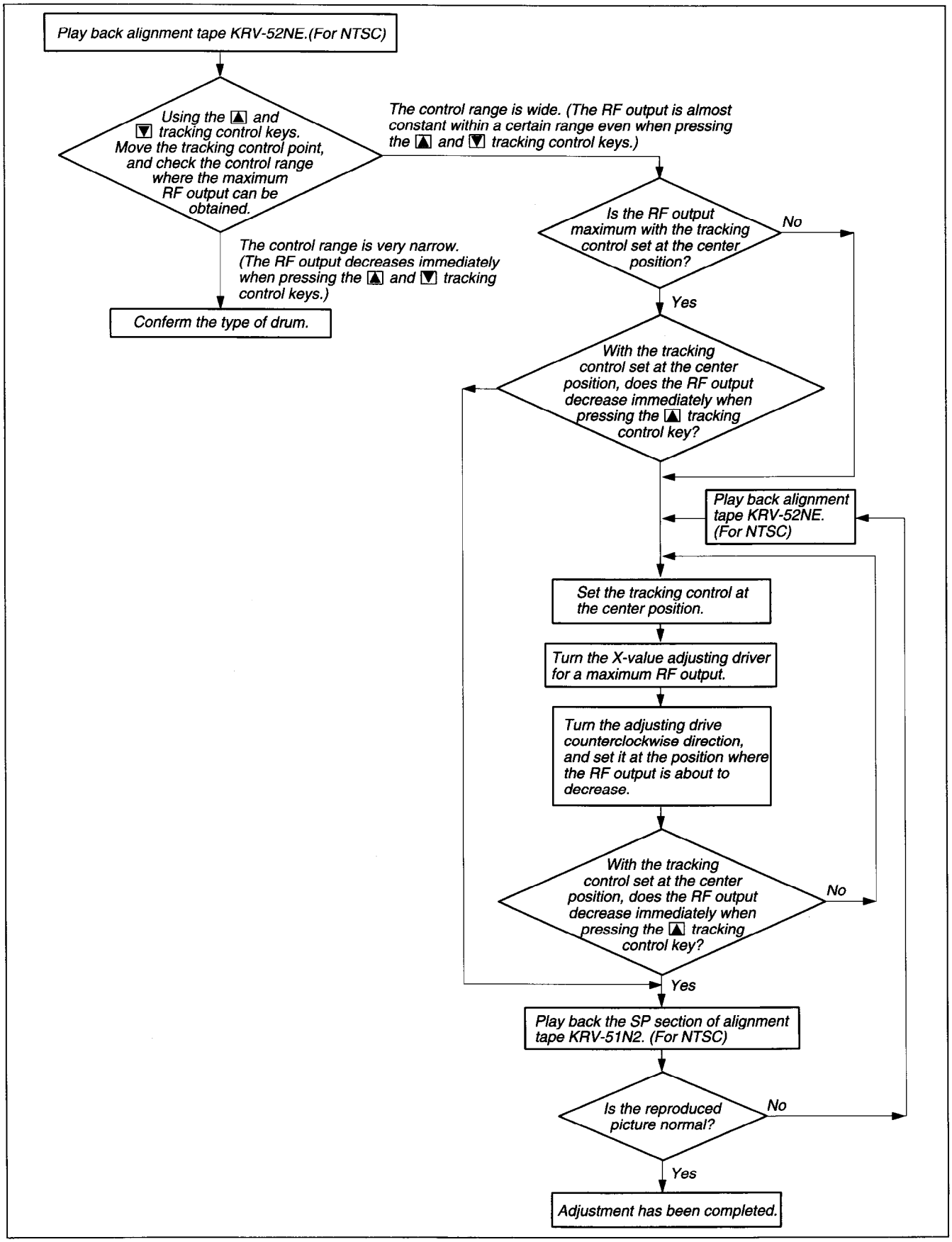

Play back alignment tape KRV-52NE.(For NTSC)
Using the ▲ and ▼ tracking control keys. Move the tracking control point, and check the control range where the maximum RF output can be obtained.
The control range is wide. (The RF output is almost constant within a certain range even when pressing the ▲ and ▼ tracking control keys.)
The control range is very narrow. (The RF output decreases immediately when pressing the ▲ and ▼ tracking control keys.)
Conferm the type of drum.
Is the RF output maximum with the tracking control set at the center position?
No
Yes
With the tracking control set at the center position, does the RF output decrease immediately when pressing the ▲ tracking control key?
Play back alignment tape KRV-52NE. (For NTSC)
Set the tracking control at the center position.
Turn the X-value adjusting driver for a maximum RF output.
Turn the adjusting drive counterclockwise direction, and set it at the position where the RF output is about to decrease.
With the tracking control set at the center position, does the RF output decrease immediately when pressing the ▲ tracking control key?
No
Yes
Play back the SP section of alignment tape KRV-51N2. (For NTSC)
Is the reproduced picture normal?
No
Yes
Adjustment has been completed.

Table. 4-9

4-1-4. HEIGHT ADJUSTMENT OF GUIDE ROLLERS NO. 3 AND NO. 6

Mode	Playback
Signal	Alignment tape: KRV-52NE (NTSC)/52PL (PAL)
Measuring instrument	Oscilloscope TIME/DIV: 2ms Trigger source: CH2 Trigger slope: +
Measuring point	CH1: Connector PB RF pin for RF PC board check CH2: Connector RF SWP pin for RF PC board check
Adjustment locations	Height adjustment screw for No. 3 tape guide roller Height adjustment screw for No. 6 tape guide roller

[Adjustment Method]

The following adjustment shall be carried out after completed Section 4-1-2. X-VALUE ADJUSTMENT.

1) Deactivate the automatic tracking control, and set the tracking control at the center position. To set the tracking control at the center position for the VCRs equipped with the ▲ and ▼ tracking control keys, press both the ▲ and ▼ tracking control keys at the same time. For the VCRs not equipped with the tracking control keys, deactivate the automatic tracking control by pressing the tracking AUTO/MANUAL key on the remote control unit during threading operation (after a tape is inserted but before the VCR starts playing back the tape).
2) Check if the RF output changes in amplitude by pressing the tracking control key. The RF output should change periodically (changes from a minimum amplitude to a maximum amplitude, and to the minimum amplitude again).

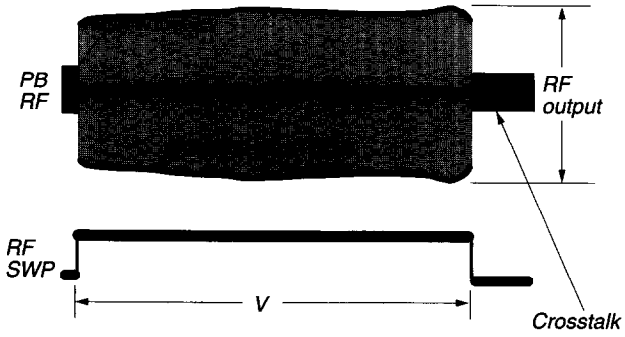


Fig. 4-4

3) Turn the height adjustment screws of tape guide rollers No. 3 and No. 6 so that the RF output envelope becomes as flat as possible.
4) Press the ▲ tracking control key, and check that both the beginning and end of the RF output change together the same in amplitude.
5) Press the ▼ tracking control key, and check that both the beginning and end of the RF output change together the same in amplitude.

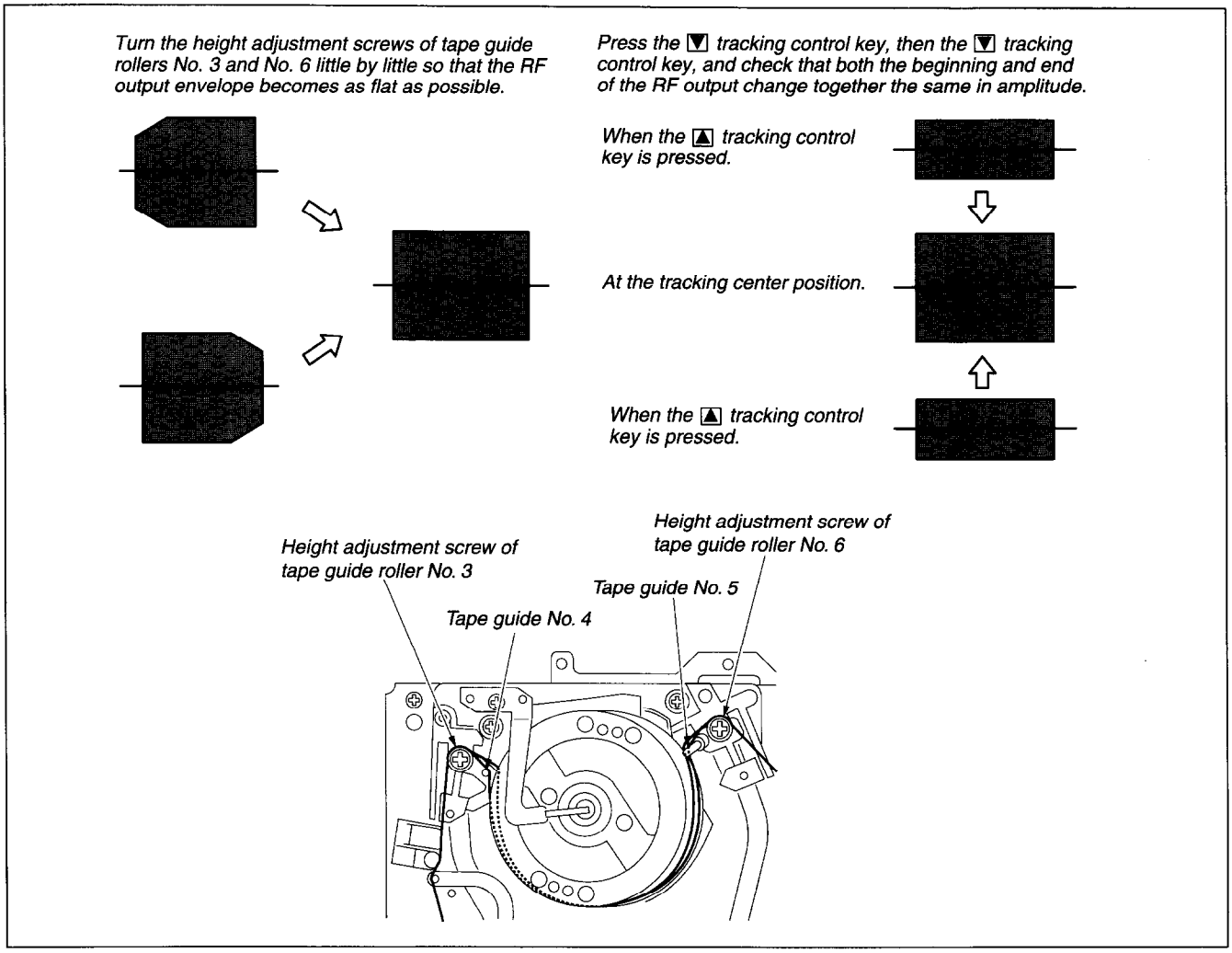

Turn the height adjustment screws of tape guide rollers No. 3 and No. 6 little by little so that the RF output envelope becomes as flat as possible.
Press the ▼ tracking control key, then the ▼ tracking control key, and check that both the beginning and end of the RF output change together the same in amplitude.
When the ▲ tracking control key is pressed.
At the tracking center position.
When the ▲ tracking control key is pressed.
Height adjustment screw of tape guide roller No. 3
Height adjustment screw of tape guide roller No. 6
Tape guide No. 5
Tape guide No. 4

Fig. 4-5

4-1-5. ACE HEAD ASSEMBLY HEIGHT AND AZIMUTH ADJUSTMENT

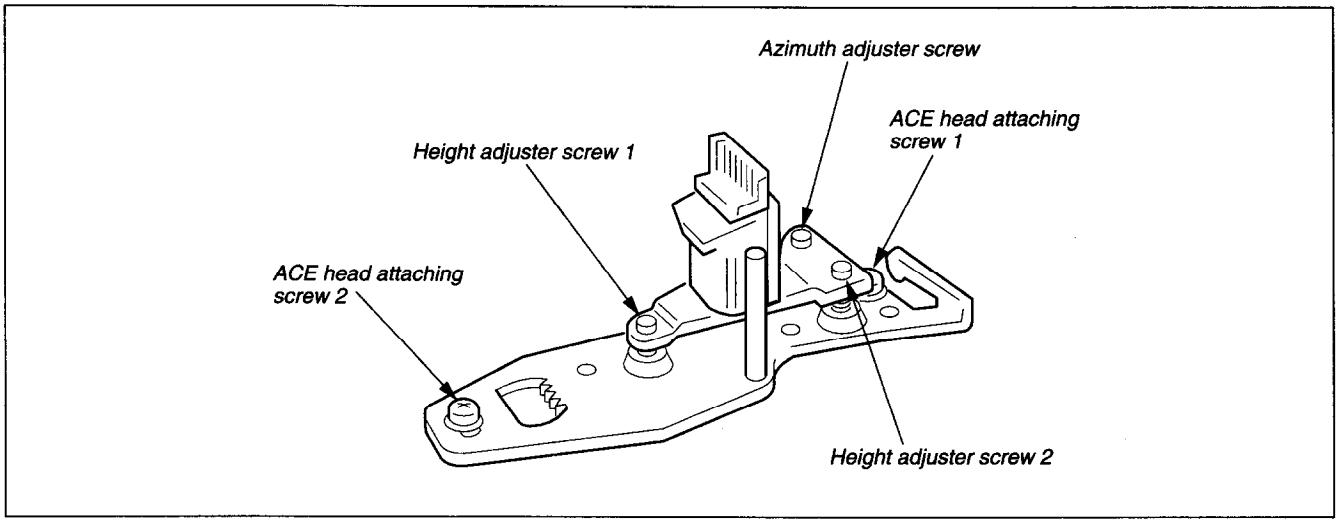

Azimuth adjuster screw
ACE head attaching screw 1
Height adjuster screw 1
ACE head attaching screw 2
Height adjuster screw 2

Fig. 4-6

Mode	Playback
Signal	Alignment tape: (5kHz) KRV-52NE (NTSC)/52PL (PAL)
Measuring instrument	Oscilloscope
Measuring point	Audio output terminal
Adjustment locations	Azimuth adjuster screw, Height adjuster screws 1 and 2.

[Adjustment Method]

1) Adjust the height as shown in the figure with turning the height adjuster screws 1 and 2, and the azimuth adjuster screw in the same direction, the same degree gradually.

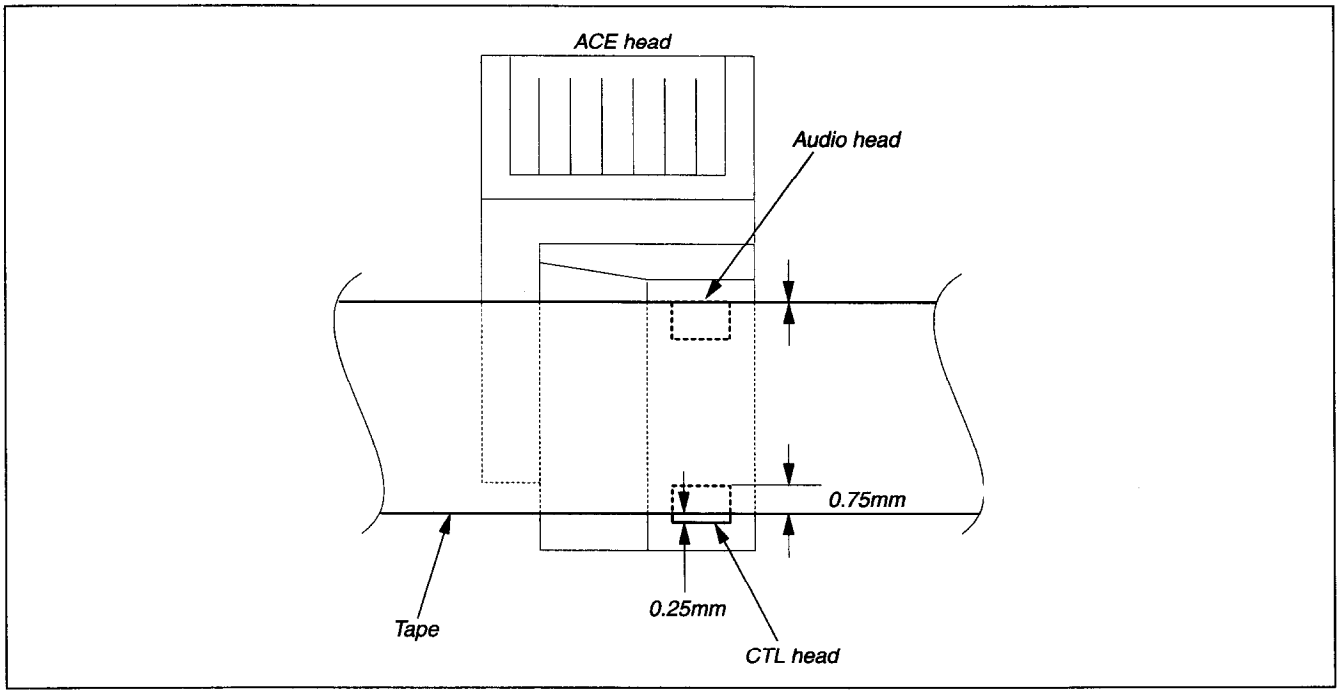


Fig. 4-7

2) Alternately adjust the azimuth adjuster screw to make A maximum and B minimum. (To maintain even audio output at maximum with minimum deviation.)
3) Perform section 4-1-2. X-VALUE ADJUSTMENT.
4) Tighten ACE head attaching screw 2. (Torque: More than 0.29 N•m (3.0 kg•cm)).

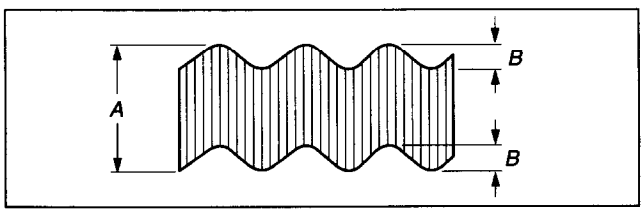


Fig. 4-8

4-1-6. X-VALUE FINE ADJUSTMENT

The procedure is the same as the item 4-1-3. Please refer to pages 37 to 46.

4-1-7. HEIGHT ADJUSTMENT OF GUIDE ROLLER NO. 8

Note : Applicable to the set having TG8 height adjusting screw as shown in the figure. Do not adjust when TG8 height adjusting screw is not attached.

Mode	Playback
Signal	Any signal on thin tape (T-160 or the like) near the tape top.
Adjustment location	TG8 height adjusting screw

[Adjustment Method]

1) Confirm there is no wrinkles of tape between TG8 and capstan and no tape curl at the upper or the lower flanges of TG8 during 10 seconds CUE running.
2) When there is curls or wrinkles, adjust with TG8 height adjusting screw.
3) Confirm there is no wrinkles of tape between TG8 and capstan and no tape curl at the upper or the lower flanges of TG8 during 8 seconds REV running.
4) When there is curls or wrinkles, adjust with TG8 height adjusting screw.

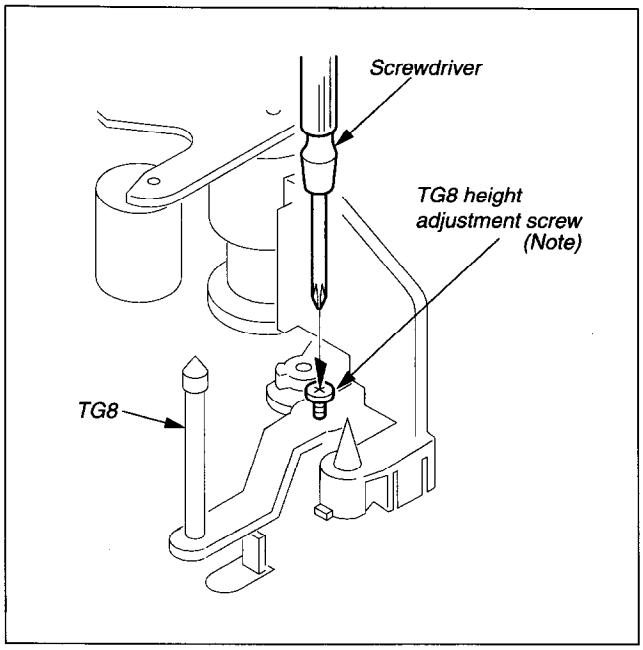


Fig. 4-9

4-1-8. CHECKING THE LINEARITY AND FLUCTUATION OF THE RF OUTPUT

1) Set the RF output to the maximum level using the tracking buttons.

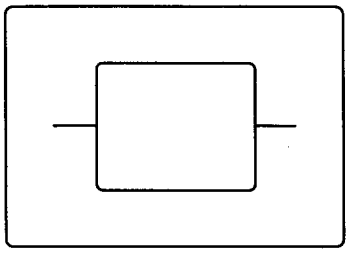


Fig. 4-10-1

2) Perform fine adjustment of the voltage level range of the oscilloscope, adjust the RF output deviation to within 6 gradations.

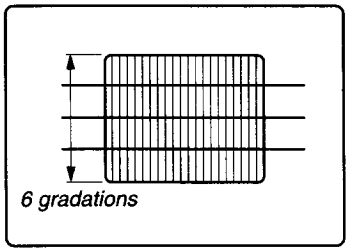


Fig. 4-10-2

3) Press the tracking buttons and adjust the maximum amplitude of the RF output to within 4 gradations.
4) At this time, check if the minimum amplitude is more than 2 gradations.

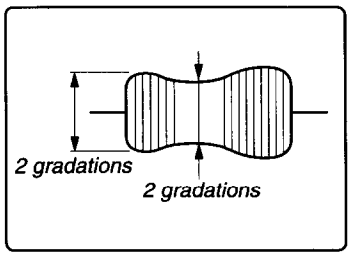


Fig. 4-10-3

5) Check that RF output fluctuation between minimum and maximum levels is within 13%.

5. EXPLODED VIEWS

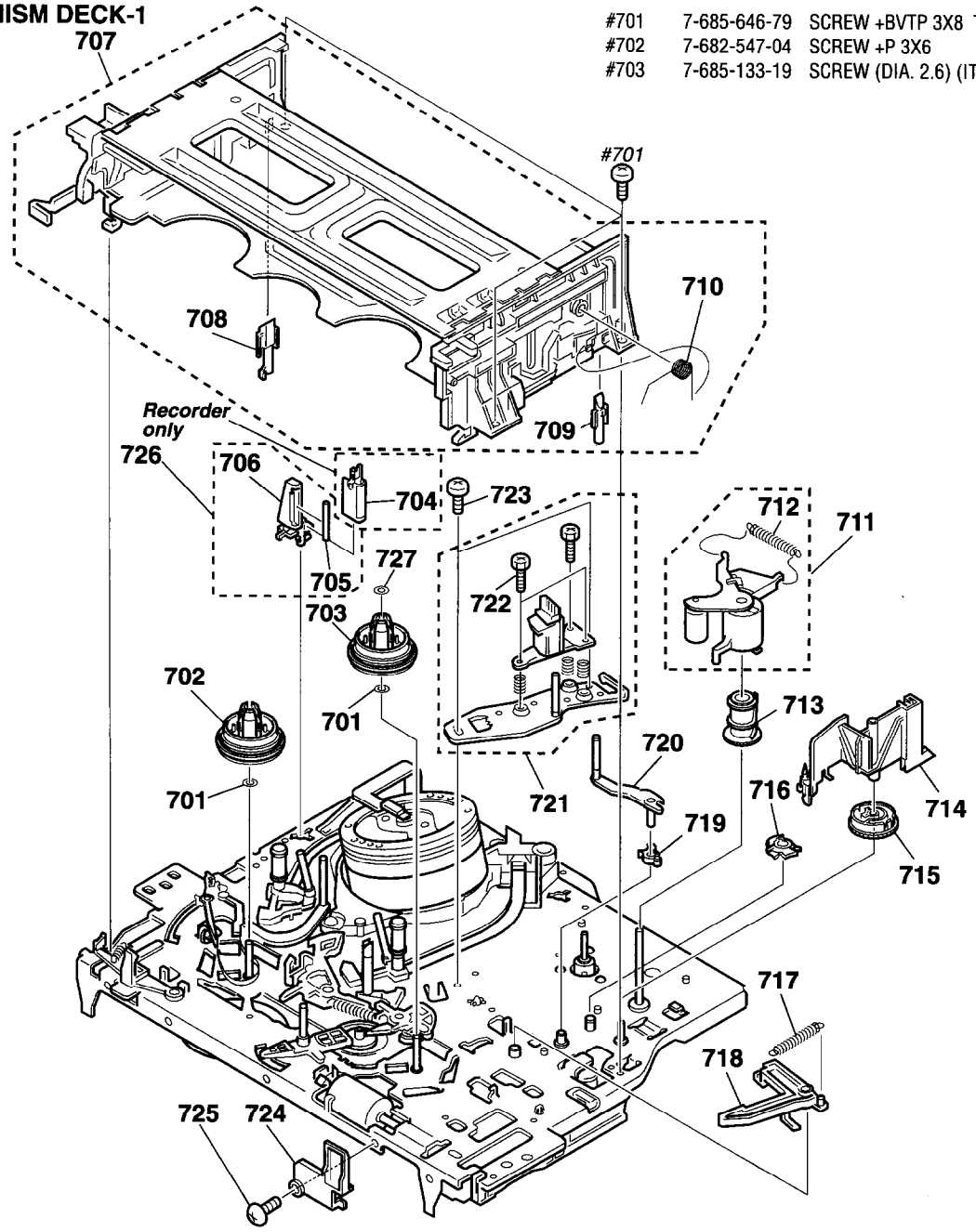
Note:

- -XX, -X mean standardized parts, so they may have some differences from the original one.
- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- The mechanical parts with no reference number in the exploded views are not supplied.

****
HARDWARE LIST
****

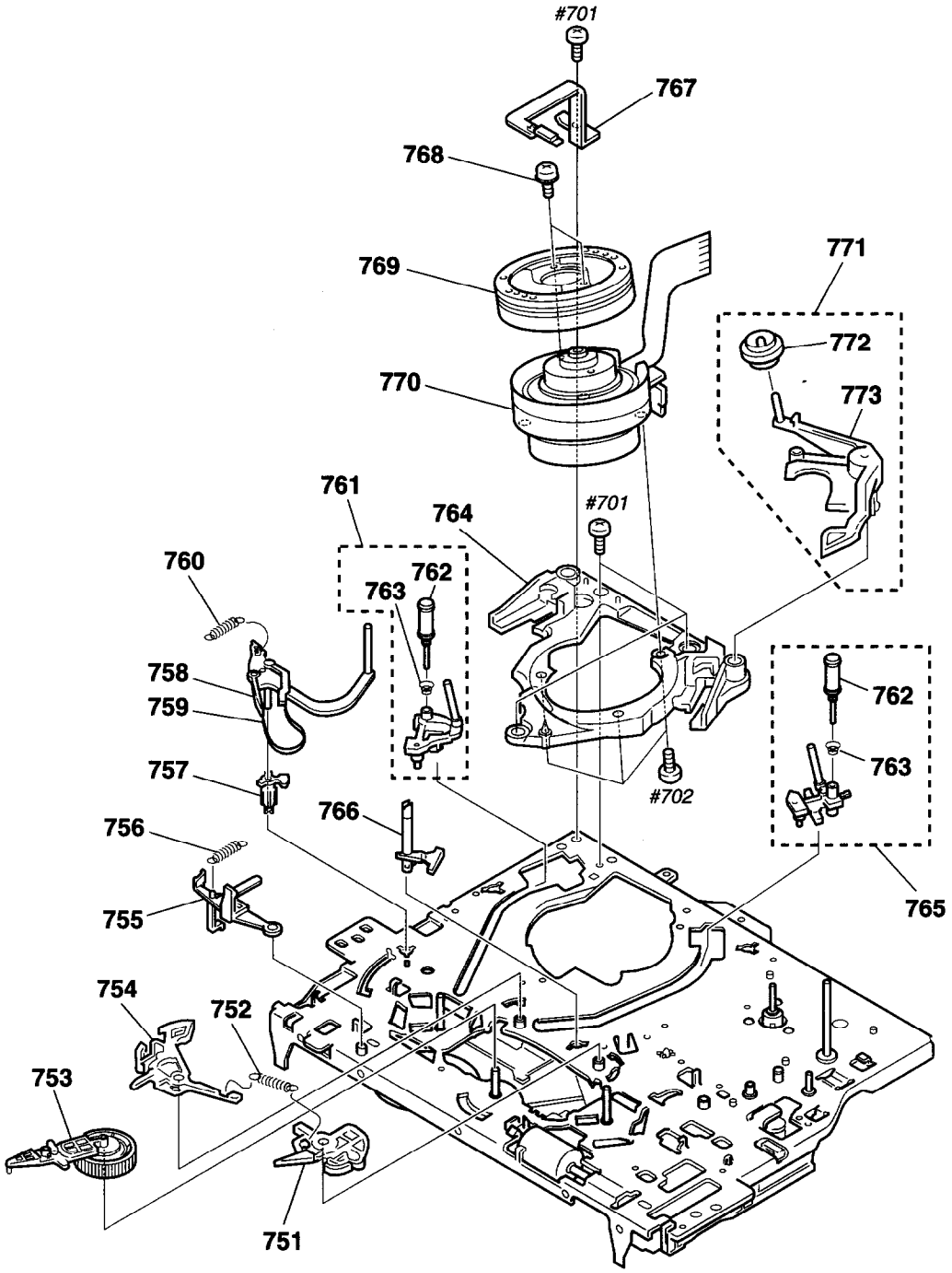
#701	7-685-646-79	SCREW +BVTP 3X8 TYPE2 IT-3
#702	7-682-547-04	SCREW +P 3X6
#703	7-685-133-19	SCREW (DIA. 2.6) (IT3B)

5-1. MECHANISM DECK-1



Ref. No.	Part No.	Description	Remarks
701	3-977-509-01	WASHER, THRUST	
702	3-977-507-01	TABLE, REEL (S) (GRAY)	
703	3-977-508-01	TABLE, REEL (T) (BLACK)	
704	1-500-144-11	HEAD, FE (RECORDER)	
705	3-977-495-01	SHAFT TG2 (RECORDER)	
706	3-977-494-01	HOLDER, FEH (RECORDER)	
707	A-6759-619-A	FL COMPLETE ASSY BOARD, COMPLETE	
708	3-977-535-01	PLATE, LUMINOUS(END SENSOR)	
709	3-977-536-01	PLATE, LUMINOUS(TOP SENSOR)	
710	3-970-471-01	SPRING (DECK OPEN), TORSION	
711	A-6759-615-A	PRESS BLOCK ASSY, PINCH	
712	3-958-455-01	SPRING (PINCH), TENSION	
713	3-977-447-01	GEAR, ELEVATOR	
714	3-977-514-01	OPENER, LID	
715	3-977-441-01	GEAR, PINCH PRESSING	
716	3-977-445-01	GEAR, TG8 ARM DRIVING	
717	3-977-465-01	SPRING,EXTENSION(RVS BRAKE)	
718	X-3947-582-1	ARM ASSY, RVS BRAKE	
719	3-977-446-01	GEAR, TG8 ARM	
720	X-3947-590-1	TG8 ASSY	
721	A-6759-620-A	HEAD BLOCK ASSY, ACE (TDK)	
722	3-974-556-01	+ HEXA TT 2.6X9 (TAPER)	
723	3-979-508-01	SCREW	
724	3-978-485-01	PLATE, GUIDE CASSETTE	
725	3-696-519-01	+P IT3 SCREW 3X8	
726	X-3947-817-1	FEH, ASSY (PLAYER)	
727	3-977-443-01	WASHER, STOPPER	

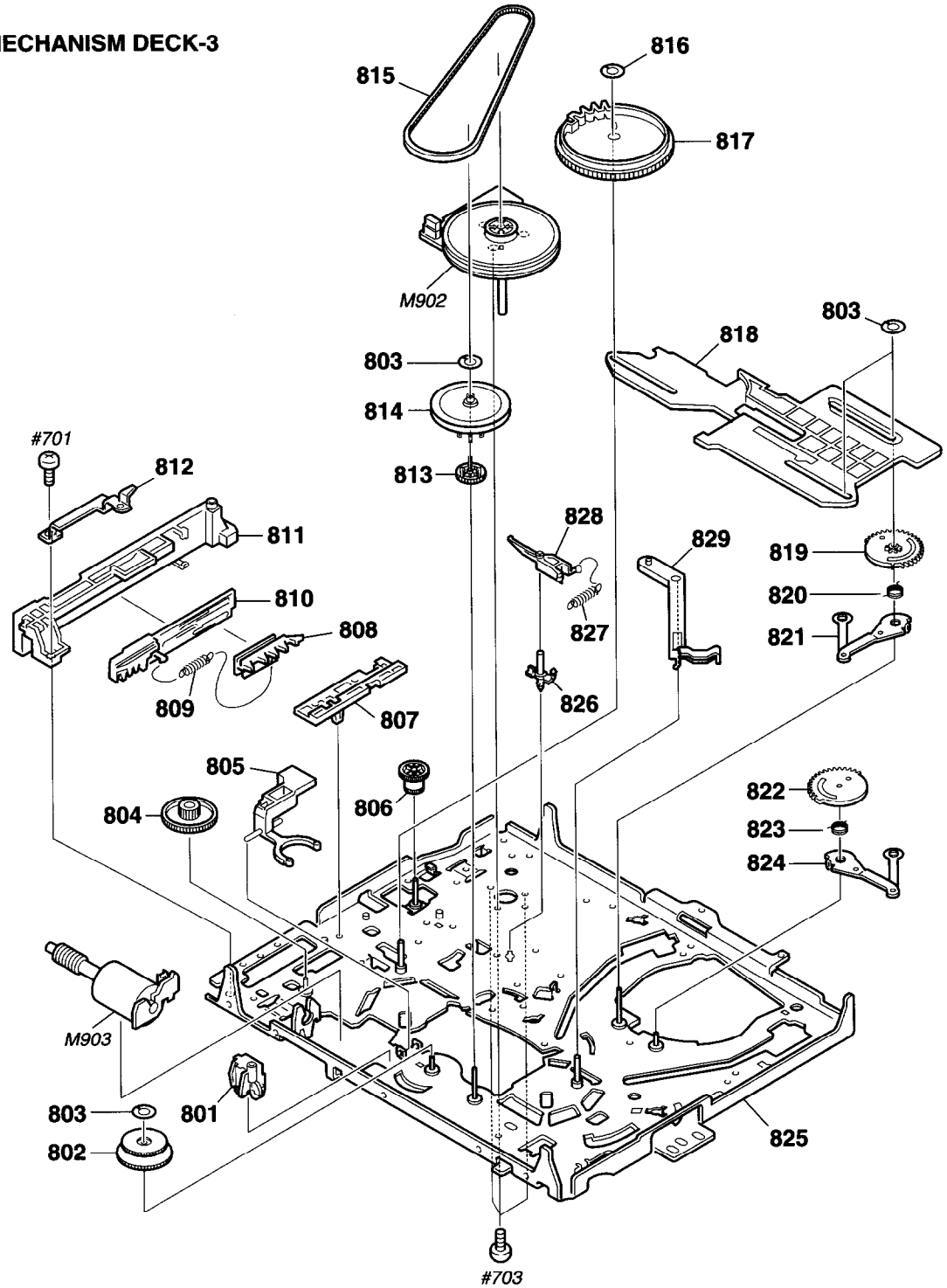
5-2. MECHANISM DECK-2



Ref. No.	Part No.	Description	Remarks
751	X-3947-581-1	BRAKE ASSY,MAIN(T)	
752	3-977-462-01	SPRING,EXTENTION. (MAIN BRAKE)	
753	X-3947-573-1	ARM ASSY, PENDULUM	
754	X-3947-580-1	BRAKE ASSY, MAIN(S)	
755	3-977-513-01	LEVER, REC. PROOF	
756	3-976-767-01	SPRING, TENS. (REC. PROOF)	
757	3-977-487-01	BOSS, TG1 FULCRUM	
758	X-3947-587-1	TG1 ASSY	
759	X-3947-589-1	BAND ASSY, TG1	
760	3-977-488-01	SPRING (POWER TENSION)	
761	A-6750-324-A	SHUTTLE (S) BLOCK ASSY	
762	X-3944-378-1	ROLLER ASSY, GUIDE	

Ref. No.	Part No.	Description	Remarks
763	3-965-178-01	SPRING	
764	3-969-629-01	BASE, DRUM	
765	A-6750-325-A	SHUTTLE (T) BLOCK ASSY	
766	3-977-501-01	PLATE, LUMINOUS	
767	X-3943-899-8	GROUND ASSY, SHAFT	
768	2-643-205-01	SCREW	
769	Refer to the service manual for each model.		
770	Refer to the service manual for each model.		
771	A-6759-614-A	ROLLER BLOCK ASSY, HC	
772	X-3947-255-1	ROLLER ASSY, HC	
773	3-977-537-01	ARM, HC ROLLER	

5-3. MECHANISM DECK-3



Ref. No.	Part No.	Description	Remarks
* 801	3-977-437-01	RETAINER,CAM MOTOR	
802	X-3947-584-1	ASSY, REEL DIRECT	
803	3-977-443-01	WASHER, STOPPER	
804	3-977-438-01	WORM - WHEEL	
805	3-977-506-01	ARM, LIMITTER SELECTION	
806	3-977-444-01	GEAR, PINCH TRANSMISSION	
807	3-977-515-01	GUIDE, FL SLIDER	
808	3-977-517-01	PLATE, SLIDE, FL	
809	3-977-519-01	SPRING, TENS. (LIMIT, FL)	
810	3-977-518-01	PLATE, LIMITTER, FL	
811	3-977-516-01	HOLDER, FL SLIDER	
812	3-977-877-01	PLATE, RETAINER	
813	3-977-504-01	GEAR, CLUTCH	
814	X-3947-585-1	GEAR ASSY, PULLEY	
815	3-977-510-01	BELT, RUBBER	
816	3-977-440-01	WASHER, STOPPER	

Ref. No.	Part No.	Description	Remarks
817	3-977-439-01	GEAR, CAM	
818	3-977-442-01	SLIDER	
819	3-977-455-01	GEAR, LOADING(T)	
820	3-977-456-01	SPRING, TORSION (LOAD T)	
821	X-3947-579-1	LEVER ASSY, LOADING(T)	
822	3-977-451-01	GEAR, LOADING(S)	
823	3-977-452-01	SPRING, TORSION (LOAD S)	
824	X-3947-578-1	LEVER ASSY, LOADING(S)	
825	X-3947-576-1	CHASSIS ASSY, MECHANICAL	
826	3-977-468-01	SHAFT, CAPSTAN BRAKE	
827	3-977-467-01	SPRING, CAP BRAKE	
828	X-3947-583-1	BRAKE ASSY, CAPSTAN	
829	3-977-489-01	ARM, TG1 DRIVING	
M902	1-698-971-11	MOTOR, DC	
M903	X-3947-577-1	MOTOR ASSY, CAM	

9-921-647-13
(Including 9-921-647-11, -12(81))

Sony Corporation
Home A&V Products Company

98E16101-1(2)
Printed in Japan ©1997.10
Published by Quality Assurance Dept.
(Osaki East)